THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVII. No. 404—20th YEAR.] LONDON, APRIL 14, 1868. [Subscription per Ann. 15s. in Advance 18s. Credit.] DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL
COAL. Analysis by Dr. FYFE, M.D.:—
9746 cubic feet of gas per ton of coal.
26-candle gas.
13½ cwt. coke per ton of coal.
N.B.—Ramsay's Cannel most resembles the Marquis of Lothian's Cannel, but superior as to coke.
RAMSAY'S PATENT CONDENSED COKE,
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828.
FIRE-BRICK WORKS, established 1804.
FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire Clay.
The Fire Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article.
The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the works are the most extensive in the Kingdom.
Manufactories: DERWENTHAUGH, SWALWELL, and HEBBURN QUAY. Offices: BROAD CHARE, NEWCASTLE-UPON-TYNE. Address, G. H. RAMSAY.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.
These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.
1862.
CLASSES X. AND XXXI.
CLASS X.—"*For ingenuity, completeness, and efficiency of apparatus used in measuring gas, and for excellence of material and workmanship.*"
CLASS XXXI.—"*For superiority of construction and workmanship.*"
Particulars and lists of prices forwarded on application to Ranelagh Works, Ranelagh Road, Pimlico, LONDON, S.W.; 15, Market Street, MANCHESTER; or 127, Boulevard de Magenta, PARIS.

IMPROVED GASLIGHT.
Ample experience has proved that, by carburetting common gas, its illuminating power may be doubled or even tripled, and its consumpt greatly lessened. Wax candles and oil lamps in consequence are being rapidly superseded, and gas is now used in many private houses and mansions where formerly it was not tolerated.
Information as to the apparatus, fluids, &c., may be had of GEO. GLOVER and CO., or CARLESS, BLAGDEN, and CO., HACKNEY WICK, N.E.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay are promptly executed at their Works as above.
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ALMA WORKS,
WALSALL, STAFFORDSHIRE;
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Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.
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Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.
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WET AND DRY GAS-METER
AND
STREET-LAMP
MANUFACTURERS,
BELL BARN ROAD, BIRMINGHAM.
ESTABLISHED 1830.
All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

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WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.
London Agents: JAMES LAWRIE & CO., 63, OLD BROAD STREET, CITY, LONDON.

THE "LOTHIAN" CANNEL COALS.
These Cannels are extensively used in the Gas-Works of Edinburgh, where the illuminating power of the gas is the highest in Britain.
The yield per ton is 12,573 cubic feet; illuminating power 33·8 standard candles; coke per ton 1046 lbs.
Ports of Shipment, in the Firth of Forth.

AYRSHIRE CANNEL COALS.
These Cannels are used in Glasgow, Greenock, Paisley, and other Gas-Works on the West Coast of Scotland.
The yield per ton is 10,650 cubic feet; illuminating power 24 standard candles; coke per ton 1216 lbs.
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NOTICE.
LESMAHAGO GAS OR CANNEL COAL.
JAMES FERGUSON & CO., Auchinheath COLLIERY, LESMAHAGO, and the NITSHILL & LESMAHAGO COAL COMPANY, AUCHINHEATH AND SOUTHFIELD COLLIERIES, LESMAHAGO, sole Proprietors and Producers of the above celebrated GAS COAL, beg to intimate to Gas Companies and other consumers that, having reason to suspect that Cannel or other Coal of very inferior quality, both as regards the quantity and illuminating power of the Gas, has frequently been mixed with and sold under the name of "Lesmahago," they have now appointed Messrs. JAMES LAWRIE & Co., of 63, Old Broad Street, LONDON, E.C., sole agents for England; and Messrs. LA COUR & WATSON, of LEITH, sole agents for foreign markets; and, in order to prevent a recurrence of the frauds named, they request that all purchasers will send their orders through the above-named firms. Orders for other than the above-named markets may be forwarded direct to either of the Proprietors.
The Proprietors will, in future, use their own forms of bills of lading, and also issue certificates of origin, signed, as the case may be, either by JAMES FERGUSON & Co., or by the NITSHILL & LESMAHAGO COAL COMPANY; and they request all consumers purchasing Lesmahago Coal to demand such a certificate for each cargo, and to observe that it corresponds with the bill of lading.
Auchinheath, Lesmahago, March, 1868.

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GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,
LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.
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"Unquestionably the best Water Gas-Meter now in use."
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WITH
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JOURNAL OF GAS LIGHTING ONE PENNY

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KINDER AND KINSEY'S PATENT.

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Having secured the above Patent, which embodies considerable and important improvements upon the Lenoir Engine, are now prepared to execute orders for Engines of one, two, and three horse power made in accordance therewith.

These Engines are worked with a very small quantity of water. They can be fixed for a nominal sum, and their working power will be guaranteed for twelve months.

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1862.

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MADE ONLY BY

GEORGE HALLETT & CO.,

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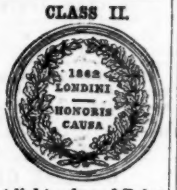
CLASS II.



This Paint having been in general use over six years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (28s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs under 20s. per cwt., as compared with White Lead at 28s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

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1795.

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THE ORIGINAL

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210,000 IN USE.

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GAS-METER MANUFACTURERS.

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Price List on application.
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HARRIS and PEARSON,
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BEST CLASS-HOUSE POT AND CRUCIBLE CLAY
MANUFACTURERS OF
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AMBLECOTE FIRE CLAY AND BRICK WORKS,
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Late in the occupation of I. and W. King. Originally J. Pilcock, Esq.
NB A quantity of best Clay Retorts in stock, viz.—Circulars, 14 inches, 15 inches. 16 inches.
D's, 16×12, 15×14, 20×16, 16×18.

INTERNATIONAL EXHIBITION, 1862. CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
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NEWCASTLE-ON-TYNE.

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SCOTSWOOD FIRE-BRICK WORKS,
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FIRE-BRICK AND TILE MERCHANTS,
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FALCON DOCK, 78 AND 79, BANKSIDE,
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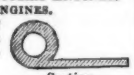
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

WOOD SIEVES for GAS PURIFIERS.

THE BEST AND CHEAPEST
CAN BE PURCHASED FROM
T. COULTHARD, WEST STRAND, PRESTON, LANCASHIRE.

HANCOCK'S INDIA-RUBBER GAS-TUBING.
All sizes, from ⅛ in. to 4 in. diameter and upwards.
Also,
HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.
INDIA-RUBBER BAGS for GAS-MAINS.
WASHERS for GAS and STEAM JOINTS.
VALVES (pure solid Rubber) for STEAM-ENGINES.
PACKING (Elastic) for STEAM-ENGINES.
FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.



Section.
Illustrated Price Lists on application.
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Vulcanized India-Rubber Works,
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And every Description of
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Including
MEDIÆVAL FITTINGS for CHURCHES, &c.
Large Pattern Books complete, with Book of Prices, 7s. 6d.

Trade Mark. THE MEDAL FOR 1862.
THE ONLY PRIZE MEDAL AWARDED FOR TUBES AND FITTINGS.
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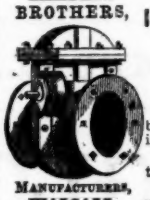

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REDUCED PRICES OF
IMPROVED GAS-VALVES
WITH WROUGHT-IRON PINIONS.
2, 2½, and 3 in.... 12s. per in.
4 in. to 6 in..... 11s. „
7 in. to 12 in..... 10s. „
These Valves are all proved on both sides to 30 lb. on the square inch before leaving the works.
Valves made with outside racks to order.
Also Water-Valves, with gun-metal faces and gun-metal screws.

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J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS;
IMPROVED CRYSTAL STAR & SUN LIGHTS;
VESTIBULES,
IRON BARREL, COMPOSITION TUBING,
AND
GAS-FITTINGS OF EVERY DESCRIPTION.
WORKS:
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REGISTERED CRYSTAL CHANDELIER.

Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music-Halls, and Public or Private Buildings with Gas.
GAS MOONS OF THE NEWEST DESIGNS.
The Patent Gas-Regulator & Purifier reduced to 6s. 6d. per Dozen.
Pattern Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1868, are now complete.
CITY SHOW-ROOMS & MANUFACTORY,
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PHŒNIX IRON-WORKS,
GLASGOW,
Manufacturers of all kinds of
GAS AND WATER PIPES,
Branches, Bends, Water-Traps, Tank-Plates, Valves, and general Castings. Also
RAILWAY CHAIRS & SLEEPERS,
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GRIFFIN'S PATENT PERMANENT WAY.
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J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
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SOCKET, FLANGE, HOT-WATER PIPES, AND ALL CONNEXIONS; RETORTS, HYDRAULIC MAIN, LAMP-COLUMNS, &c.; AND EVERY DESCRIPTION OF CASTINGS AND WROUGHT-IRON-WORK FOR GAS AND WATER-WORKS, STEAM, AND GENERAL PURPOSES.
N.B.—All goods kept in stock, and supplied at wholesale prices. Estimates given, and orders by post punctually attended to the same day.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water-Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
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Established 1840.

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DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

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N.B.—A large stock of 2 to 8 in. pipes usually ready for immediate delivery.

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FOUNTAINBRIDGE
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73, COLEMAN STREET, LONDON, E.C.
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MANUFACTURERS AND CONTRACTORS FOR GAS-WORKS
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AND
JOHN STREET, ADELPHI, LONDON, W.C.

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CONSULTING ENGINEER,
WENLOCK IRON WORKS,
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Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.
Plans, Specifications, and Estimates prepared.

ADDISON POTTER,
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NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

THE

UNIVERSAL EXHIBITION OF PARIS,

1867.

SILVER MEDAL.

THOMAS GLOVER,

DRY GAS-METER MANUFACTURER,

CLERKENWELL GREEN, LONDON,

HAS BEEN AWARDED THE HIGHEST PRIZE FOR

DRY GAS-METERS,

BY THE IMPERIAL COMMISSIONERS FOR THE

UNIVERSAL EXHIBITION, 1867.

WILLIAM PARKINSON AND CO.

(SUCCESSORS TO SAMUEL CROSLEY),

PATENT WET AND DRY GAS-METER MANUFACTURERS, &c.

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Established 1816.

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W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

"It is well known that n Meters constructed so that the valve will close when the water is drawn off to such a point as to render them 3 per cent. slow the lights are liable to be extinguished by the closing of the valve by a sudden increase of pressure. To meet this difficulty, Mr. Pinchbeck has invented an ingenious and simple arrangement by which the action is reversed, and any such increase of pressure, in his Meter, raises the value instead of depressing it. The fact of the improvement having been adopted by Messrs. W. Parkinson and Co. is a sufficient guarantee that it practically and effectually remedies the inconvenience it is designed to meet."—JOURNAL OF GAS LIGHTING.

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STATION-METERS AND GOVERNORS.

Which can be seen at all the London Gas-Works. Also Liverpool, Manchester, Sheffield, Nottingham, Belfast, Glasgow, Birmingham, Dublin, Bristol, Leeds, Leicester, Brighton, Southampton, Sunderland, Wolverhampton, Bradford, Norwich, &c., &c.

TEST GASHOLDERS, EXPERIMENTAL METERS, EXHAUSTER REGULATORS,

MINUTE CLOCKS, PRESSURE GAUGES, PHOTOMETERS, PRESSURE REGISTERS, &c.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

NOTICES.

The subscription to the JOURNAL is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders should be made payable at the Money-Order Office, London, to William B. King, 11, Bolt Court, Fleet Street, by whom the business department of the JOURNAL is conducted.

The next number will be published on Tuesday, April 28, and the subsequent numbers on each successive alternate Tuesday.

This JOURNAL has been duly registered at the General Post-Office for transmission abroad.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

All communications for the Editor to be addressed, "No. 42, Parliament Street, Westminster;" and all remittances for subscriptions or orders for advertisements to the Publisher, No. 11, Bolt Court Fleet Street.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 14, 1868.

Notes upon Passing Events.

THE question of the transmission and development of cholera in town populations has recently been discussed, with unusual advantages for collecting reliable evidence, by the Metropolitan Association of Medical Officers of Health, at their monthly meeting on the 21st of March, of which we give a full report in another place. The discussion was founded on a paper read by Dr. Letheby, "On the Cholera Epidemic of 1866 contrasted "with former Epidemics of the Disease, and an Examination "of the Question whether the Water Supply had any Con-"nexion with the Disease." It would seem that nothing can appear more capricious than the course of cholera in its journey from the damp plains of India, which are its perpetual home, through Europe; but when it does arrive and sit down anywhere, the extent of its ravages are very much limited by the condition of sanitary arrangements. Thus London has always been in advance of any other city in its sanitary arrangements, and has always suffered less than Paris, Cologne, New York, Liverpool, Hull, Belfast, Limerick, and this was proved in 1848-9, in 1854, and 1866. It invariably takes severe hold of low-lying districts, with a sodden soil and a dense poor population. In London the difference has been between 17 in 10,000 in the well-to-do districts, and 40 to 67 per 10,000 in those where the poorest classes congregate. Again, the mortality amongst those who were members of provident and temperance societies was much below the average; and the mortality was greatest on Wednesdays, after Sunday and Monday holidays, and smallest on Fridays. Dr. Letheby has examined with close scrutiny the theory that the local character of the outbreak is due to the infected districts being supplied with water charged with choleraic matter. But, although the value of pure water to health is undoubted, and the danger of drinking from wells polluted by sewage filterage unquestionable, the sweeping assumption that the outbreak of cholera in the east of London was due to contamination imbibed from the East London Water-Works will not, to use the obvious pun of one of the speakers, "hold water." Dr. Letheby puts the question with his usual neat incisiveness. The alleged pollution of the water rests upon a series of assumptions. It happened that two deaths from cholera occurred on the 27th of June at Bromley, in the neighbourhood of the East London Water-Works, although far removed from their source of supply. It is assumed that the alvine discharges of two sick persons were cast into the privy, found their way into the river Lea, there diffused through a volume of water and passed upwards opposite an open but rarely used reservoir of the water company, then soaked through a thick embankment, and so obtained access to the water of the uncovered reservoir; that on a certain day some of this water was admitted into the covered reservoir from which the public supply was taken, and then distributed to the district afterwards affected by cholera. But, admitting all these assumptions, an examination shows that the district so supplied was not generally stricken with cholera. This statement is supported by names and dates. If the East London water had been the cause of cholera, the outbreaks ought to have been simultaneous; but it will be seen that a month elapsed between the first outbreak in the several districts. While the disease was most violent in the poor low-lying regions between Whitechapel and St. George's-in-the-East, the well-to-do population round Stamford Hill and the well-paid population of Silver Town, supplied with the same water, were absolutely untouched. Again, the purity of the water supplied by the New River Company has never been impugned, yet the mortality in a district of Whitechapel, supplied by the New River Company, amounted to 69 per 10,000; while in 161 houses, with a population of 1732, in the eastern division of London, all supplied with the suspected water, not one case of cholera occurred. Again, out of 765 persons at Bow, supplied with water from a deep artesian well which was found pure on analysis, not less than 27 died of cholera, or at the rate of 353 per 10,000. Dr. Letheby, having no doubt in view the sensational writers on sanitary matters, says: "I am anxious, in dealing with a question of so "much importance, that none of the facts should be perverted, "and that no hasty or ingenious hypothesis without solid "foundation should take possession of the public mind. In "the conduct of inquiries like this, there should be a calm, a "full, and a candid examination of the facts; we should "endeavour to study the phenomena in a philosophical spirit, "and apply to them the tests of sound induction; we should "strive also to deduce from them such laws as will not only "expose the nature of the malady, but will at the same time "enable us to treat it successfully. Rash opinions, boldly "asserted and tenaciously held, though they may force them-"selves on public attention, rarely lead to useful results; and "while they have their hold on the popular mind they "seriously hinder the progress of real knowledge." The discussion which followed this able paper will well repay careful perusal.

Railway reform is one of the favourite questions of the day. It is discussed in almost every society, often with the illogical ignorance and confusion characteristic of what may be called the "parochial mind"—the narrow mind that sees only immediate personal interest in every public question. Railways

require reform in two different and even opposing directions financially, in order that the shareholders may get the largest possible surplus out of the gross earnings, may do the least possible amount of unprofitable work, and never supply any additional accommodation, unless of a kind that will pay a good dividend. This is essentially the investing shareholders question, but it is only recently, and since days of affliction, discount, and no dividend, have fallen on railway property, that the investing shareholders have had much influence in the management of their propery. The government of railways has been either in the hands of some fiery comet of an engineer and his satellites, or of a chairman surrounded by congenial officials, whose eyes have always been fixed on the operations of the Stock Exchange and all the complicated tortuous proceedings connected with what is called, in modern terms, financing. Railway extensions may have been very unprofitable to the permanent shareholders, but very profitable to the inner circle of councillors. Often, when a frightful crash takes place in the company's stock, we hear of directors buying additional estates, or enlivening the London season with a series of suburban *fêtes* of a gorgeous description, where the highest aristocracy condescend to rub shoulders with Manchester goods, plain but rich. Well, that time is gone by. Railways have seen their worst. The traffic of the country grows, and ordinary business rates will eventually give dividends, even to the most depressed of the lines with metropolitan termini. Big things have had their day; the broad gauge is doomed; its continued existence only depends on the means of the Great Western Company for replacing it with a narrow gauge. Even big stations and big hotels are no longer in favour. When investing shareholders have succeeded in mastering railway accounts, and in compelling their officers to furnish statements of payments and receipts under such heads and in such a form that they can be understood and criticized by any man of business of ordinary intelligence, a great step in advance will be made; for mystery, if not the mother of fraud, is the godmother of extravagance and idle waste. The difficulty will not in future be to prevent unprofitable extensions from being made, but to get them made when they are necessary for profit and public convenience. The possibility of constructing and working lines much cheaper than on the old system is a subject which is being pressed on public attention by several of the younger engineers. The older and successful race, of course, like things as they are, and as they were when they made their fame and money. Railways grew from tramways to their present costly and ponderous perfection. Of course, the old hands do not like to return towards the idea of tramways, light rails, light engines, and light carriages to carry light fares.

In the present session two engineers, long connected with the "Permanent Way Company"—Messrs. Richardson and Imray—have a Bill for constructing a metropolitan railway at about half the expense of the underground system, and two-thirds of the expense of a railway on brick arches, without counting the expenses for compensation for incidental damage. Instead of tunnelling or excavating on a line on solid brick arches, they propose to carry their railroad on iron girders supported by a series of columns, or rather concrete-filled caissons, about 150 feet apart, and 21 feet high, thus avoiding all the difficulties of carrying away soil, disturbing sewers, water and gas pipes, and obstructing traffic during construction. The permanent way, being wholly of iron, will be constructed in a factory, and put up as easily as a park railing. The ground occupied will be reduced to a minimum, and, unlike the case where arches are employed, the space between the columns will be easily available for houses or shops. The objection to the noise of a railway train is only a matter of rent. At the present moment houses are being erected wherever there is space as near as possible to the different metropolitan lines, and even over the Underground Railway. To secure additional economy for this omnibus railroad traffic, Messrs. Richardson and Imray propose to adopt the very narrow gauge (3 feet) which has been very successfully worked in Wales, as on the Continent and in Australia. A 3-feet gauge will admit of carriages with the most ample accommodation for passengers, and a very low centre of gravity. The length of the line "from Islington Green to Finsbury" is insignificant—only 1½ mile; but, if it receives the necessary support of capitalists, it will be an example which must speedily be imitated. Experience has proved that, with a mere passenger or omnibus line of railway, a change of carriages at adjoining stations is a sacrifice made without any extraordinary inconvenience, because the passengers have no luggage. The Clapham, the Kensington, and the Dalston Junctions have accustomed the London public to change of carriages, and, therefore, to a change of gauge if necessary. The slow progress of the District Metropolitan, and the sacrifices the directors have been obliged to make in order to get the capital for proceeding from Kensington to Westminster, show plainly enough that, for many years to come, it will be impossible to float schemes for railways at half a million a mile. Therefore, as the demand for transit accommodation does not diminish, the cheap plan of the two before-mentioned experienced engineers must command attention. A 3-feet gauge means lighter carriages, lighter engines, less wear and tear, less difficulty in stopping and going on. There is good reason to believe that, for some years past, excited by the temptation of the Great Western, our leading engineers have gone too far in the direction of heavy engines. On this subject, a paper was read the other day at the Society of Arts, by Mr. Robert Fairlie, who has invented an engine, successfully working on the Brecon Railway—"a double-boiler engine," without tender, drawing a cheap kind of composite carriage, which has been highly approved by Capt. Tyler, the Government Inspector of Railways. It is not our province to discuss the mechanical merits of this invention; it is enough to call attention to it.

The subject of unnecessary dead weight is one of the most important to the shareholders—one of the causes of reduced dividends—but it is a defect that it is not to the interest of the public to amend. In this country all public bodies and public men live more or less under the pressure of public opinion. To conciliate public opinion, as expressed in local and other newspapers, and to gain favour in parliamentary contests, railway companies not only run more trains per day than any of the well-paying lines of the Continent, but run more carriages, by from two-thirds to four-fifths, than are required for the number of passengers carried. To reduce the number of trains, and also the number of carriages, by making passengers change carriages at every junction, if there were any empty carriages unoccupied in the main trunk train, are reforms that would be very advantageous to railway shareholders, and would be in strict accordance with the principles on which the much-vaunted French lines are worked. But these are not reforms which would be approved by ordinary railway reformers. There are people like Sir J. Pakington, and speakers of less luck and lower social position at the Society of Arts, who are obtuse enough to quote the Great Eastern and the London, Chatham, and Dover, as parallel to the constructive mismanagement of the Admiralty. The case against the Admiralty is not that it spends a great deal of money, but that it does not supply an efficient navy for the money. The Great Eastern Railway has been a sad failure for its shareholders, but it has given to a great agricultural district cheap and convenient carriage, for produce especially, and has afforded passengers advantages which the French Government has been unable to obtain for small rural districts at a great sacrifice of national money. The London, Chatham, and Dover Railway first accommodated a rural district which landowners ignorant opposition had "left out in the cold," and next gave an example of perfection in a combination of railway pier and steamboat accommodation which has never been equalled except on the Holyhead line, and finally crossed the Thames, and joined the south to the north by a direct metropolitan line. These are signs that the railway chairmen of the new generation will be strong enough to overrule the jealousies of officials, and put a stop to such follies as running two trains to the same point at the same hour. We may see the whole of the South Coast and South-Eastern lines amalgamated, but when it is done the benefit of local accommodation will remain—every station that commands a traffic sufficient to pay a fractional profit will be used. This will be a reform for the benefit of the shareholders, but not the sort of reform which wild speakers and writers mean when they ask for the accommodation of English competition and the dividends of continental monopoly.

The Society of Arts at their last meeting were favoured with a paper of more than ordinary absurdity by a Mr. Raphael Brandon, with the clap-trap title of "How to make Railways "remunerative to the Shareholders, beneficial to the Public, "and profitable to the State." His idea was termed by one of the speakers, "startling;" another agreed that it was, but also observed not more startling than a proposition to supply the 16s. trousers of the celebrated Mr. Miles at 6d. a pair. Mr.

Brandon has been comparing the total number of trains run, and the total number of passengers, and the total amount received, and has thus calculated that the average fare paid by each is 14d. He has altogether forgotton that to make this average he has included all the fares at 6d. and under, of the metropolis, of the Lancashire and Yorkshire, and of the Staffordshire and Worcestershire lines, and all other short lines. The passengers of the Underground alone are more than those of any one line in the kingdom. From this average he calculates that six times as many passengers as now travel could be carried for the same cost. On this assumption he proposes to have fares on the uniform principle of the Post-Office. Because the Post-Office carries a half-ounce letter from Aberdeen to Falmouth for 1d., he proposes to carry a man, weighing say 150 lbs., the same distance for 1s. first class, 6d. second class, and 3d. third class. The absurdity is too great to deserve discussion. Mr. Brandon evidently fancies that cost of draught does not depend on the weight carried, and that carriages cost nothing. Imagine "To Brighton, on a summer "Sunday, 3d.," and "To Paris, at a great *fête*, 1s." Of course this splendid scheme is only to be carried out by the amalgamation of all the lines under Government management. We give the proposal in the author's own words that it may be seen we have not misrepresented his idea:—

I find that during the year ending 1865, passenger trains to the number of 3,448,509 ran over 71,206,818 miles, carried 251,959,862 passengers, and produced £14,724,802; this gives an average of nearly 21 miles and 73 passengers for each train, that is about 3½ passengers for each mile, the average fare paid by each passenger being 1s. 2d.

Six times the number of passengers could be carried for a very small (if any) additional expense, and if a universal fare of 3d. was charged for any distance for each person, at a very moderate computation six times the present number would travel, and would produce £18,896,989, being £4,172,187 in excess of the present receipts.

The above calculation is made supposing that each person pays only a threepenny fare; but as it will be necessary to divide the passengers into different classes, a much larger receipt may be reckoned upon; for this purpose I would divide the traffic first in half, supposing that half the passengers would travel by single fares (that is to say, would pay for each journey at the time), and these I would subdivide into three classes, as follows: At 1s. for first class, 6d. for second class, 3d. for third class.

In the discussion that followed, some of the stock fallacies were reproduced. Mr. Moxon, whose Stock Exchange experience ought to have taught him better, regretted that a proposal had not been adopted when the Liverpool and Manchester line was opened—viz., that the Government "should "lay down all the trunk lines and let them to the lowest "bidders;" that is to say, that the Government in 1830, which knew nothing, should take the business out of the hand of the Stephensons and all the talent collecting round them, and put it into the hands of the late Mr. James Walker or the Royal Engineers. It is so easy to be wise and prophetic after an event. In Government hands a century would not have made our railway system, judging by the progress of artillery before Armstrong and Whitworth came to the assistance of Government. The Government engineers of France for ten years impeded the introduction of railways into that country. The official engineers of Italy are the great obstacles to the drainage and reclamation of millions of acres in that kingdom. Another speaker pointed out that in England constructive and inventive talent was best rewarded by private enterprise, while in France and Germany the Government had a system for absorbing the cream of schools and colleges in Government employment, and he thought that under this system British commerce and manufactures had the best of the bargain, as the routine of Government work, with certain exceptions, could be done well enough by very ordinary men. There are well-informed persons who believe that clever Mr. Reed is the great impediment to improvements in naval construction, and clever Captain Boxer a monopolist of improvements in small-arm cartridges. Mr. Moxon also deprecated competition and the Trent Valley line. Is he or any one else prepared to shut up the Trent Valley, or any other line like it? How often must it be repeated that we must be content to pay something and somehow for having so soon netted the kingdom over with railways. The public pay in some inconvenience from rival railways, the shareholders pay in short dividends; but we none of us pay in taxes or the penalties of a close monopoly, and a despotism of railway officials.

Circular to Gas Companies.

Mr. Morrison's Metropolis Gas Bill was read a second time in the House of Commons on the 2nd inst., the promoter of it having consented to withdraw and to modify the clauses relating to compulsory purchase which were objected to by the gas companies. In the amended Bill the power to be given to the Commissioners of Sewers and the Metropolitan Board of Works to purchase the gas undertakings of the existing companies is limited to three years, and power is also given to the companies to sell; but it is provided that no purchase of any of the existing undertakings shall be valid unless the whole of them be purchased at the same time. The 5th clause, as amended, now stands as follows, the words in italics having been introduced:—"At any time *within three years* "after the passing of this Act, the Metropolitan Board of "Works or the Commissioners of Sewers may purchase from "any company, *and any company may sell to either of those* "*bodies* the undertaking of any company: *provided always,* "*that no purchase of any of the companies shall be valid unless* "*the undertakings of the whole of the said companies shall be* "*at the same time purchased.*" The 6th clause which—inconsistently with the preceding one as it originally stood—limited the time of purchase to six months, and provided that the terms of purchase should, in default of agreement, be determined by arbitration, has been struck out without any substitute, and the Bill now contains no provision for settling the terms or conditions on which the undertakings of the companies are to be transferred to the local authorities. The absence of such a provision, and the added proviso that no purchase of any undertaking shall be valid unless the whole be purchased at the same time, would throw almost insuperable difficulties in the way of any transfer of the works to the Metropolitan Board or to the Commissioners of Sewers. To render such a sale possible, it would be necessary not only that all the companies should agree to sell, but that the Commissioners of Sewers and the Metropolitan Board should act in concert in making the purchase; unless, indeed, the latter body were to undertake the additional responsibility of supplying the City with gas. Practically, therefore, the power of purchasing and selling conferred by the Bill would be entirely nugatory, and the 19th and 20th clauses—which would have given power to the Metropolitan Board of Works and the Commissioners of Sewers to take gas in bulk from any of the companies, and to distribute it by separate mains—have been struck out, so that they could not supply gas even at second hand. The provisions for the amalgamation of the metropolitan gas companies remain unaltered in the amended Bill, with the exception of the omission of the clause which limited the amalgamation to the unpurchased companies, and by which the number, when amalgamated, was not to exceed four. The only other portion of the Bill in which any alteration has been made is that relating to dividends, an important amendment having been made in clause 46, by striking out the words which excluded "damages or expenses of or consequent in any "accident" from being reckoned as a deficiency of profits; so that, as the clause at present stands, forfeitures and penalties only are excluded from being "deemed such a deficiency as is "authorized by this Act to be made up in the next subsequent "year." The Bill, as thus amended, has been referred to a select committee of five members, appointed by the Committee of Selection. Of those five, three sat on the committee of last year, including Mr. Cardwell as chairman, Mr. J. Peel, and Mr. J. Hardy; with Mr. Greene (Bury St. Edmunds) and Mr. Holland (Evesham) as substitutes for Mr. Gabriel Goldney and Mr. J. Shaw Lefevre. Though not much favour can be expected for the metropolitan gas companies from a committee of which Mr. Cardwell is chairman, there is reason to hope that the knowledge gained since last session, of the diminished revenues of gas companies, with the present prices and illuminating power, may have somewhat altered his views respecting the price and quality of the gas that can be supplied in London with remunerative profit. It may be observed, also, that the Bill to be submitted to the committee, though represented by Mr. Morrison to be nearly a reprint of the amended Bill of last session, differs from it in several points, some of which are more favourable and others more adverse to the companies; and, though justice requires that it should undergo several important alterations, it is not so far a departure from the principles to which the companies expressed themselves willing to accede as to prevent it from being moulded into such a form as to be accepted by the companies and beneficial to the public. The circumstances under which the Bill is introduced into Parliament are more favourable to a settlement of the long-vexed question of the supply of gas to the metropolis than the Bill of last session. That Bill was not

heartily supported by any, and no one seemed to care whether it was passed or withdrawn; but the present Bill comes before Parliament promoted by parties who are directly interested in its success, for if it fail they will have to pay their share of the costs, which, if it be successful, will be borne by the Metropolitan Board of Works. The provision for the payment of back dividends for one year—which the companies did not object to receive as a compromise—is retained in Mr. Morrison's Bill, though struck out by Mr. Cardwell from the Bill of last session; and it may be presumed that, with his experience of the past, he will not now object to it. The striking out of that provision was "the last feather" of the companies concessions, and we trust the experiment will not be tried again. The extent to which the metropolitan gas companies can reasonably concede to the demands of the public are already known, and those who desire to see the question of the gas supply of London equitably adjusted will not require more.

The Bills of the Imperial and of the Chartered Companies, and the Gas Bill of the Corporation of London, have also been referred to the same committee; but it seems probable that the latter would not be proceeded with should Mr. Morrison's Metropolis Gas Bill pass through Parliament. That Bill would authorize the purchase by the Corporation of the works which now supply the City with gas, should they be so minded after the passing of a measure that would secure to the public more advantages than could be expected from a supply of gas under the management of the Corporation. The progress of the Amalgamation Bill, promoted by a majority of the metropolis companies, is for the present suspended.

The Glasgow City and Suburban Gas Company and their secretary, Mr. Thomson, have been proceeded against for nuisance, in the police court of that city, and threatened with penalties of fine or *imprisonment*. The nuisance complained of was, that offensive vapours and smells, and large volumes of black smoke and of dust, were emitted from the ventilators of one of the retort-houses into the street, to the great annoyance of the inhabitants. Some novel preliminary objections to the proceedings were taken by the company's advocate, one of which was, that as they had been authorized by Parliament to manufacture gas, they were consequently authorized to make vapour and smells, which were necessary concomitants to the manufacture of gas. Another objection was to the jurisdiction of a police court in the matter, it being contended that the company could not be made amenable to such a court because a conviction involved the penalty of imprisonment, and it would be impossible to imprison the whole company. Those objections having been overruled, several witnesses were called to prove that smoke was often seen issuing from the lower ventilators of the retort-house into the street, and the *onus* of proving that the best means of preventing or counteracting the nuisance had been adopted was thrown on the defendants. The engineer and manager of the works confidently asserted that all practicable means to prevent the occasional issue of smoke and smell had been taken, and that to close the ventilators, as had been suggested, would be to stop the supply of gas, as the men would be unable to work. Other skilled witnesses spoke of the good arrangements of the works, which were said to be as well constructed as any in the kingdom. It appeared that in consequence of the greatly increased demand for gas—which had risen from 75 millions of cubic feet in 1845, the first year, to 491 millions in 1867—the space for the works had become much restricted, and the retort-house had necessarily been built abutting on the street. The city architect stated that it would be impossible to remove the nuisance complained of unless the gas-works were reconstructed on a new principle, and even then it was doubtful whether there would be any alternative between the removal of the people living in the neighbourhood or the removal of the gas-works altogether. The magistrate before whom the case was heard, guided principally by the evidence of the architect, decided that the charge was "*Not proven*," adding that "the court think it well to "state to the gas company that this ought to be abated as "much as possible." This recommendation appended to the decision of the Scotch baillie brings to mind the verdict of the Irish jury—"'*Not guilty*;' and we hope he will never do so "again!"

The ardour of Local Boards, in their opposition to gas companies when applying to Parliament for additional powers, will be somewhat damped by a recent decision of the district auditor of the accounts of the Slough Local Board to surcharge five of the late members of the Board, in consequence of their having expended the money of the ratepayers in opposing the Bill of the Slough Gas Company in 1866. The members on whom the liability to pay the costs of the opposition was thus unexpectedly thrown appealed to the Home Secretary, averring, of course, that they had only been actuated by considerations for the public good, and an inspector was thereupon sent to Slough to examine into the matter. The investigation took place on the 3rd inst., and the proceedings will be fully reported in our next. There was no dispute about the facts of the case, which may be thus briefly summed up: The Local Board of Slough consisted of twelve members, eight of whom voted for opposing the company's Bill, on the alleged grounds that the works on their present site were a nuisance and had poisoned the wells in the neighbourhood, and that it would be to the advantage of the ratepayers that the opportunity should be taken to compel the company to improve the quality of the gas. Of the eight who so voted, four were directors of a competing company, which had also a Bill before Parliament that was subsequently withdrawn; and the clerk of the Board was the secretary of that company. It was asserted, in addition, that one of the objects they had in opposing the Bill was to compel the old company to purchase land in the possession of their rivals for a new site. It was further stated, by the counsel who appeared to support the surcharge, that the amount paid for opposing the Bill never appeared in the estimate of the Local Board. As there was no dispute about the main facts, no witnesses were called to prove them, and the proceedings were confined to discussions and the examination of documents. The inquiry ended without any opinion being expressed by the inspector, who said he should make his report to the Home Secretary in due course. The result will be looked for with interest by all gas companies who are liable to be exposed to vexatious opposition by local authorities, who will, it is hoped, receive a useful warning from the decision of the district auditor at Slough against the illegal squandering of the money of ratepayers.

The new gas company at Neath, which obtained an Act, in 1866, authorizing them to manufacture and supply gas in competition with another company, have been placed in an awkward predicament by the omission to insert in the preliminary notice of their intention to apply to Parliament that they should require power to purchase and use the works of the existing company. Neath is a small borough in Glamorganshire of about 9000 inhabitants, and it had been supplied with gas for upwards of 30 years by a company without statutory powers, who failed in opposing the new company's Bill, though in the committee of the House of Lords a clause was introduced into the Bill enforcing the purchase of the old works, if required, the valuation to be made under the Lands Clauses Consolidation Act, modified by an authority given to the Board of Trade to appoint an umpire should the arbitrators not agree on the value. The capital of the new company was limited to £16,000 in shares, with power to borrow £4000; but it seems that at the time their Act was passed only £6060 of the share capital had been subscribed. In due time notice was given, calling on them to purchase the old works, and arbitrators were appointed, but as they were not able to agree on the estimated value, the Board of Trade appointed Mr. T. N. Kirkham, engineer of the Imperial Company's gas-works at Fulham, as umpire. The evidence given was of the usual contradictory kind; the witnesses on behalf of the vendors, in their mode of valuation, taking the commercial value at 16⅔ years purchase of the net profits, and the witnesses for the purchasers taking only the structural value, reduced to a very low figure by allowances for depreciations and for new works required to meet the increasing demand for gas. It was proved that about £7000 had been expended on the works, of which sum £6000 had been subscribed by the proprietors and £1000 expended out of profits. The umpire ultimately awarded £12,180 as the value of the undertaking, and, as the purchasers had made no offer, they have, according to the provision of the Lands Clauses Consolidation Act, to pay the costs on both sides, which will probably amount to £2500. The difficulties of the new company are further increased by their not being able to use the works, for which they have to pay so large a sum, in consequence of the omission before mentioned to give the parliamentary notice required before introducing their Bill into Parliament. That omission will probably necessitate another application to Parliament next year, as it would be madness to attempt to

proceed with the erection of new works, though contracts have been entered into for that purpose. The construction of a new tank has, indeed, been commenced, and, as if to add to the misfortunes of the company, it appears that it will not hold water. The present desperate situation of the Neath New Gas Company ought to be a warning against entering into competition with an established undertaking, even though the latter be without statutory powers.

The Manchester Gas Committee, at a time when the Corporation are appropriating anticipated gas profits, inopportunely recommended an increase of the salaries of three of their principal officers—two of them from £500 to £650 per annum, and the other from £400 to £500; but the City Council, at their recent monthly meeting, while admitting the great merits of those officers, limited the increase in each case to £100. This cheese-paring economy is calculated to defeat itself by the dissatisfaction the long discussion on it cannot fail to produce on the gentlemen whom the increase was intended to propitiate. Indeed, according to the statement of Mr. Hopkinson, one of the City Council, Mr. Macfarlane, the engineer and manager of the works at the Gaythorne station, must have added thousands of pounds annually to the Corporation funds by his superior management. In contrast with his exalted merits the engineers of the London gas companies, it appears, must hide their diminished heads; for it is asserted by Mr. Hopkinson that, having visited several of the gas-works in the metropolis, he found that "at one of them the cost per ton in one operation alone was 10d., while the same operation at the Manchester works was only 1¾d.," which difference was attributable to the superiority of Mr. Macfarlane over the London engineers. That assertion will probably be seized hold of, during the forthcoming parliamentary struggle, as evidence of the want of due care and management in the metropolitan gas companies, and Mr. Hopkinson may be called on to make good his assertion. At all events, if it be true to the extent of one hundredth part, the services of Mr. Macfarlane are very stintingly acknowledged by grudging the addition of £150 to his salary.

Communicated Article.

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EXPERIMENTS ON THE FLOW OF GAS IN LONG PIPES,

MADE IN THE WORKS OF THE PARIS GAS COMPANY.

(*Continued from page 226.*)

Tables of Loss of Pressure, due to the Flow of Gas in Cast-Iron Pipes 1000 mètres long, at the Temperature of 0° Centigrade, and with the Barometer at 0·76m of Mercury.

These tables have been calculated by means of the formula (deduced from 13)

$$H = \frac{4L}{D} \times \frac{1{\cdot}293 \times \delta}{1000} (av + bv^2).$$

[H being the loss of pressure expressed in mètres of water, and δ being the specific gravity of the gas, that of atmospheric air being unity.]

This formula will give, within the ordinary limits of gas distribution, results only very slightly differing from those of the rigorous formula.

$$\frac{V_0^2}{2g}\left(\frac{8bgL}{D} + 4{\cdot}6052 \log \frac{p^0}{p^1}\right) =$$

$$\frac{10{\cdot}334\,(1+\alpha t)}{2 \times 1{\cdot}293 \times \delta}\left[1 - \left(\frac{P^1}{P_0}\right)^2\right] - \frac{4L}{D}\, avo\, \frac{P_0 + P_1}{2P_0}.$$

Note.—For gas at the mean temperature of the ground (12° Cent. = 54° Fahr.) it is necessary to multiply the loss of pressure here given by 0·96.

Diameter = 0m·050. *Section* = 0m·001963. *Coefficient* a = 0 000702. *Coefficient* b = 0·000593.

Volumes Discharged in Cubic Mètres. Per Second.	Per Hour.	Volumes in English Feet per Second.	Mean Velocities in Mètres per Second.	Loss of Pressure for 1000 Mèters long, expressed in Mètres of Water. Air.	Gas.
0·0005	1·800	0·0176	0·254	0·0223	0·0091
0·0010	3·600	0·0353	0·509	0·0528	0·0216
0·0015	5·400	0·0529	0·764	0·0912	0·0374
0·0020	7·200	0·0706	1·018	0·1374	0·0563
0·0025	9·000	0·0883	1·273	0·1917	0·0786
0·0030	10·800	0·1059	1·528	0·2541	0·1041
0·0035	12·600	0·1236	1·782	0·3240	0·1328
0·0040	14·400	0·1412	2·037	0·4023	0·1649
0·0045	16·200	0·1589	2·292	0·4882	0·2001
0·0050	18·000	0·1766	2·546	0·5823	0·2387
0·0055	19·800	0·1942	2·801	0·6845	0·2806
0·0060	21·600	0·2119	3·055	0·7943	0·3257
0·0065	23·400	0·2295	3·310	0·9123	0·3740
0·0070	25·200	0·2472	3·565	1·0383	0·4257
0·0075	27·000	0·2648	3·819	1·1717	0·4804
0·0080	28·800	0·2825	4·074	1·3137	0·5386
0·0085	30·600	0·3002	4·329	1·4637	0·6001
0·0090	32·400	0·3178	4·584	1·6217	0·6649
0·0095	34·200	0·3355	4·838	1·7865	0·7324
0·0100	36·000	0·3532	5·093	1·9607	0·8038
0·0105	37·800	0·3708	5·347	2·1418	0·8781
0·0110	39·600	0·3885	5·602	2·3317	0·9560
0·0115	41·400	0·4061	5·857	2·5291	1·0369
0·0120	43·200	0·4238	6·111	2·7343	1·1210
0·0125	45·000	0·4414	6·366	2·9480	1·2086
0·0130	46·800	0·4591	6·620	3·1687	1·2992
0·0135	48·600	0·4768	6·876	3·3993	1·3937
0·0140	50·400	0·4944	7·130	3·6359	1·4907
0·0145	52·200	0·5121	7·384	3·8804	1·5909
0·0150	54·060	0·5297	7·639	4·1340	1·6949

Diameter = 0m·054. *Section* = 0·0002290. *Coefficient* a = 0·000682. *Coefficient* b = 0·000575.

0·0005	1·800	0·0176	0·218	0·0167	0·0068
0 0010	3·600	0·0353	0·436	0·0387	0·0158
0·0015	5·400	0·0529	0·655	0·0661	0·0271
0·0020	7·200	0·0706	0·873	0·0986	0·0404
0·0025	9·000	0·0883	1·091	0·1363	0·0559
0·0030	10·800	0·1059	1·310	0·1795	0·0735
0·0035	12·600	0·1236	1·528	0·2272	0·0931
0·0040	14·800	0·1412	1·746	0·2811	0·1152
0·0045	16·200	0·1589	1·965	0·3400	0·1394
0·0050	18·000	0·1766	2·183	0·4039	0·1656
0·0055	19·800	0·1942	2·402	0·4734	0·1943
0·0060	21·600	0·2119	2·620	0·5478	0·2246
0·0065	23·400	0·2295	2·838	0·6274	0·2572
0·0070	25·200	0 2472	3·056	0·7122	0·2920
0·0075	27·000	0·2648	3·275	0·8027	0·3291
0·0080	28·800	0·2825	3·493	0·8980	0·3681
0·0085	30·600	0·3002	3·712	0·9991	0·4096
0·0090	32·400	0·3178	3·930	1·1046	0·4528
0·0095	34·200	0·3355	4·148	1·2156	0·4983
0·0100	36·000	0·3532	4·366	1·3321	0·5461
0·0105	37·800	0·3708	4·585	1·4541	0·5961
0·0110	39·600	0·3885	4·803	1·5810	0·6482
0·0115	41·400	0·4061	5·022	1·7135	0·7025
0·0120	43·200	0·4238	5·240	1·8507	0·7587
0·0125	45·000	0·4414	5·485	1·9931	0·8171
0·0130	46·800	0·4591	5·677	2·1415	0·8780
0·0135	48·600	0·4768	5·895	2·2944	0·9407
0·0140	50·400	0·4944	6·113	2·4526	1·0055
0·0145	52·200	0·5121	6·332	2·6165	1·0727
0·0150	54·000	0·5297	6·550	2·7852	1·1419

Diameter = 0m·081. *Section* = 0m2·005153. *Coefficient* a = 0m·000589. *Coefficient* b = 0m·000489.

0·001	3·6	0·035	0·194	0·0083	0·0034
0·002	7·2	0·070	0·388	0·0192	0·0078
0·003	10·8	0·105	0·582	0·0324	0·0133
0·004	14·4	0·141	0·776	0·0479	0·0196
0·005	18·0	0·176	0·970	0·0658	0·0269
0·006	21·6	0·212	1·164	0·0860	0·0352
0·007	25·2	0·247	1·358	0·1085	0·0445
0·008	28·8	0·282	1·552	0·1336	0·0547
0·009	32·4	0·318	1·746	0·1607	0·0658
0·010	36·0	0·353	1·940	0·1903	0·0780
0·011	39·6	0·388	2·134	0·2223	0·0911
0·012	43·2	0·424	2·328	0·2566	0·1052
0·013	46·8	0·459	2·522	0·2932	0·1202
0·014	50·4	0·494	2·716	0·3322	0·1362
0·015	54·0	0·530	2·910	0·3736	0·1532
0·016	57·6	0·565	3·105	0·4187	0·1717
0·017	61·2	0·600	3·299	0·4636	0·1900
0·018	64·8	0·636	3·493	0·5120	0·2099
0·019	68·4	0·671	3·687	0·5627	0·2307
0·020	72·0	0·706	3·881	0·6158	0·2524
0·021	75·6	0·742	4·075	0·6711	0·2751
0·022	79·2	0·777	4·269	0·7290	0·2989
0·023	82·8	0·812	4·463	0·7891	0·3235
0·024	86·4	0·848	4·657	0·8517	0·3492
0·025	90·0	0·883	4·851	0·9165	0·3757
0·026	93·6	0·918	5·045	0·9837	0·4033
0·027	97·2	0·953	5·239	1·0533	0·4318
0·028	100·8	0·989	5·434	1·1256	0·4615
0·029	104·4	1·024	5·627	1·1994	0·4917
0·030	108·0	1·059	5·822	1·2761	0·5232
0·031	111·6	1·095	6·016	1·3554	0·5557
0·032	115·2	1·130	6·210	1·4366	0·5890
0·033	118·8	1·165	6·404	1·5203	0·6233
0·034	122·4	1·201	6·598	1·5963	0·6545
0·035	126·0	1·236	6·792	1·6946	0·6948
0·036	129·6	1·271	6·986	1·7853	0·7319
0·037	133·2	1·307	7·180	1·8784	0·7701
0·038	136·8	1·342	7·374	1·9737	0·8092
0·039	140·4	1·377	7·568	2·0715	0·8493
0·040	144·0	1·413	7·762	2·1716	0·8904

Diameter = 0m·100. *Section* = 0m·007853. *Coefficient* a = 0m·000550. *Coefficient* b = 0m·000475.

Volumes Discharged in Cubic Mètres. Per Second.	Per Hour.	Volumes in English Feet per Second.	Mean Velocities in Mètres per Second.	Loss of Pressure for 1000 Mètres long, expressed in Mètres of Water. Air.	Gas.
0·001	3·6	0·035	0·127	0·0040	0·0016
0·002	7·2	0·071	0·254	0·0088	0·0036
0·003	10·8	0·106	0·382	0·0143	0·0058
0·004	14·4	0·141	0·509	0·0208	0·0085
0·005	18·0	0·176	0·636	0·0280	0·0115
0·006	21·6	0·212	0·763	0·0360	0·0147
0·007	25·2	0·247	0·891	0·0447	0·0183
0·008	28·8	0·282	1·018	0·0544	0·0223
0·009	32·4	0·318	1·145	0·0647	0·0265
0·010	36·0	0·353	1·273	0·0759	0·0311
0·011	39·6	0·388	1·400	0·0879	0·0360
0·012	43·2	0·424	1·528	0·1005	0·0412
0·013	46·8	0·459	1·655	0·1142	0·0468
0·014	50·4	0·494	1·782	0·1285	0·0527
0·015	54·0	0·530	1·909	0·1436	0·0588
0·016	57·6	0·565	2·036	0·1595	0·0654
0·017	61·2	0·600	2·164	0·1764	0·0723
0·018	64·8	0·636	2·290	0·1937	0·0794
0·019	68·4	0·671	2·419	0·2123	0·0870
0·020	72·0	0·706	2·546	0·2313	0·0948
0·021	75·6	0·742	2·674	0·2513	0·1030
0·022	79·2	0·777	2·800	0·2718	0·1114
0·023	82·8	0·712	2·928	0·2917	0·1196
0·024	86·4	0·848	3·056	0·3158	0·1294
0·025	90·0	0·883	3·182	0·3387	0·1388
0·026	93·6	0·918	3·310	0·3627	0·1487
0·027	97·2	0·953	3·435	0·3869	0·1586
0·028	100·8	1·989	3·564	0·4137	0·1696
0·029	104·4	1·024	3·692	0·4391	0·1800
0·030	108·0	1·059	3·819	0·4661	0·1911
0·031	111·6	1·095	3·947	0·4941	0·2025
0·032	115·2	1·130	4·072	0·5225	0·2142
0·033	118·8	1·165	4·200	0·5518	0·2262
0·034	122·4	1·201	4·328	0·5822	0·2387
0·035	126·0	1·236	4·456	0·6134	0·2515
0·036	129·6	1·271	4·580	0·6444	0·2642
0·037	133·2	1·307	4·711	0·6779	0·2779
0·038	136·8	1·342	4·838	0·7113	0·2916
0·039	140·4	1·377	4·965	0·7454	0·3056
0·040	144·0	1·413	5·092	0·7803	0·3199
0·041	147·6	1·448	5·220	0·8163	0·3346
0·042	151·2	1·483	5·348	0·8531	0·3497
0·043	154·8	1·519	5·475	0·8903	0·3650
0·044	158·4	1·554	5·600	0·9279	0·3804
0·045	162·0	1·589	5·729	0·9659	0·3960
0·046	165·6	1·625	5·856	1·0043	0·4117
0·047	169·2	1·660	5·984	1·0478	0·4296
0·048	172·8	1·695	6·112	1·0893	0·4466
0·049	176·4	1·730	6·239	1·1314	0·4638
0·050	180·0	1·766	6·365	1·1738	0·4812
0·055	198·0	1·942	7·003	1·4009	0·5743
0·060	216·0	2·119	7·630	1·6438	0·6739
0·065	234·0	2·296	8·277	1·9141	0·7847
0·070	252·0	2·472	8·910	2·1989	0·9015

Diameter = 0m·108. *Section* = 0m²·009160. *Coefficient* a = 0m·000530. *Coefficient* b = 0m·000460.

0·001	3·6	0·035	0·109	0·0030	0·0012
0·002	7·2	0·071	0·218	0·0065	0·0026
0·003	10·8	0·106	0·327	0·0104	0·0042
0·004	14·4	0·141	0·436	0·0150	0·0061
0·005	18·0	0·176	0·545	0·0201	0·0082
0·006	21·6	0·212	0·655	0·0257	0·0105
0·007	25·2	0·247	0·764	0·0319	0·0130
0·008	28·8	0·282	0·873	0·0385	0·0157
0·009	32·4	0·318	0·982	0·0457	0·0187
0·010	36·0	0·353	1·091	0·0535	0·0219
0·011	39·6	0·388	1·200	0·0617	0·0253
0·012	43·2	0·424	1·309	0·0707	0·0289
0·013	46·8	0·459	1·419	0·0797	0·0326
0·014	50·4	0·494	1·528	0·0895	0·0366
0·015	54·0	0·530	1·637	0·0998	0·0409
0·016	57·6	0·565	1·746	0·1110	0·0455
0·017	61·2	0·600	1·855	0·1227	0·0503
0·018	64·8	0·636	1·964	0·1343	0·0550
0·019	68·4	0·671	2·074	0·1464	0·0600
0·020	72·0	0·706	2·183	0·1593	0·0653
0·021	75·6	0·742	2·292	0·1728	0·0708
0·022	79·2	0·777	2·400	0·1867	0·0765
0·023	82·8	0·812	2·510	0·2013	0·0825
0·024	86·4	0·848	2·619	0·2168	0·0888
0·025	90·0	0·883	2·729	0·2330	0·0955
0·026	93·6	0·918	2·838	0·2481	0·1018
0·027	97·2	0·953	2·947	0·2647	0·1085
0·028	100·8	0·989	3·056	0·2817	0·1154
0·029	104·4	1·024	3·165	0·2995	0·1227
0·030	108·0	1·059	3·274	0·3176	0·1302
0·031	111·6	1·095	3·383	0·3362	0·1378
0·032	115·2	1·130	3·492	0·3555	0·1457
0·033	118·8	1·165	3·600	0·3752	0·1538
0·034	122·4	1·201	3·710	0·3955	0·1621
0·035	126·0	1·236	3·820	0·4162	0·1706
0·036	129·6	1·271	3·928	0·4376	0·1794
0·037	133·2	1·307	4·039	0·4596	0·1884
0·038	136·8	1·342	4·148	0·4822	0·1977
0·039	140·4	1·377	4·257	0·5051	0·2071
0·040	144·0	1·413	4·366	0·5284	0·2166
0·041	147·6	1·448	4·475	0·5523	0·2264
0·042	151·2	1·483	4·584	0·5768	0·2365
0·043	154·8	1·519	4·694	0·6025	0·2470
0·044	158·4	1·554	4·800	0·6288	0·2578
0·045	162·0	1·589	4·910	0·6542	0·2682
0·046	165·6	1·625	5·021	0·6801	0·2788
0·047	169·2	1·660	5·130	0·7070	0·2898
0·048	172·8	1·695	5·238	0·7345	0·3011
0·049	176·4	1·730	5·348	0·7630	0·3128
0·050	180·0	1·766	5·458	0·7919	0·3246
0·055	198·0	1·942	6·004	0·9431	0·3866
0·060	216·0	2·119	6·550	1·1075	0·4540
0·065	234·0	2·296	7·096	1·2851	0·5269
0·070	252·0	2·472	7·640	1·4751	0·6047

Diameter = 0m·135. *Section* = 0m²·014313. *Coefficient* a = 0m·000470. *Coefficient* b = 0m·000442.

0·001	3·6	0·035	0·069	0·0013	0·0005
0·002	7·2	0·071	0·139	0·0028	0·0011
0·003	10·8	0·106	0·209	0·0045	0·0018
0·004	14·4	0·141	0·279	0·0063	0·0026
0·005	18·0	0·176	0·349	0·0083	0·0034
0·006	21·6	0·212	0·419	0·0104	0·0042
0·007	25·2	0·247	0·489	0·0127	0·0052
0·008	28·8	0·282	0·559	0·0152	0·0062
0·009	32·4	0·318	0·628	0·0179	0·0073
0·010	36·0	0·353	0·698	0·0208	0·0085
0·011	39·6	0·388	0·768	0·0237	0·0097
0·012	43·2	0·424	0·838	0·0269	0·0110
0·013	46·8	0·459	0·908	0·0302	0·0123
0·014	50·4	0·495	0·978	0·0337	0·0138
0·015	54·0	0·530	1·048	0·0374	0·0153
0·016	57·6	0·565	1·118	0·0412	0·0169
0·017	61·2	0·600	1·187	0·0451	0·0185
0·018	64·8	0·636	1·257	0·0493	0·0202
0·019	68·4	0·671	1·327	0·0535	0·0219
0·020	72·0	0·706	1·397	0·0581	0·0238
0·022	79·2	0·777	1·537	0·0675	0·0276
0·024	86·4	0·848	1·676	0·0774	0·0317
0·026	93·6	0·918	1·816	0·0883	0·0362
0·028	100·8	0·989	1·956	0·0998	0·0409
0·030	108·0	1·059	2·096	0·1118	0·0458
0·032	115·2	1·130	2·236	0·1247	0·0511
0·034	122·4	1·201	2·375	0·1378	0·0565
0·036	129·6	1·271	2·515	0·5121	0·0623
0·038	136·8	1·342	2·655	0·1670	0·0684
0·040	144·0	1·413	2·794	0·1823	0·0747
0·042	151·2	1·483	2·934	0·1981	0·0812
0·044	158·4	1·554	3·074	0·2152	0·0882
0·046	165·6	1·625	3·214	0·2323	0·0952
0·048	172·8	1·695	3·353	0·2503	0·1026
0·050	180·0	1·766	3·493	0·2690	0·1103
0·052	187·2	1·836	3·633	0·2883	0·1182
0·054	194·4	1·907	3·772	0·3083	0·1264
0·056	201·6	1·978	3·912	0·3290	0·1341
0·058	208·8	2·048	4·052	0·3504	0·1436
0·060	216·0	2·119	4·192	0·3724	0·1526
0·062	223·2	2·190	4·331	0·3948	0·1618
0·064	230·4	2·260	4·471	0·4182	0·1714
0·066	237·6	2·331	4·611	0·4423	0·1813
0·068	244·8	2·402	4·751	0·4670	0·1914
0·070	252·0	2·472	4·890	0·4923	0·2018
0·072	259·2	2·543	5·030	0·5180	0·2123
0·074	266·4	2·613	5·170	0·5448	0·2233
0·076	273·6	2·684	5·309	0·5723	0·2346
0·078	280·8	2·755	5·449	0·6002	0·2460
0·080	288·0	2·825	5·589	0·6295	0·2581
0·090	324·0	3·179	6·287	0·7810	0·3202
0·100	360·0	3·532	6·986	0·9505	0·3897
0·110	396·0	3·885	7·685	1·1364	0·4659
0·120	432·0	4·238	8·384	1·3388	0·5489

Diameter = 0m·150. *Section* = 0m²·017671. *Coefficient* a = 0m·000440. *Coefficient* b = 0m·000430.

0·001	3·5	0·035	0·056	0·0009	0·0004
0·002	7·2	0·071	0·113	0·0019	0·0008
0·003	10·8	0·106	0·169	0·0029	0·0012
0·004	14·4	0·141	0·226	0·0040	0·0016
0·005	18·0	0·176	0·282	0·0054	0·0022
0·006	21·6	0·212	0·339	0·0068	0·0028
0·007	25·2	0·247	0·396	0·0083	0·0034
0·008	28·8	0·282	0·452	0·0098	0·0040
0·009	32·4	0·318	0·509	0·0114	0·0046
0·010	36·0	0·353	0·565	0·0132	0·0054
0·011	39·6	0·388	0·622	0·0151	0·0062
0·012	43·2	0·424	0·679	0·0171	0·0070
0·013	46·8	0·459	0·735	0·0191	0·0078
0·014	50·4	0·494	0·792	0·0212	0·0086
0·015	54·0	0·530	0·848	0·0234	0·0096
0·016	57·6	0·565	0·905	0·0258	0·0106
0·017	61·2	0·600	0·962	0·0283	0·0116
0·018	64·8	0·636	1·018	0·0307	0·0125
0·019	68·4	0·671	1·075	0·0334	0·0137
0·020	72·0	0·706	1·132	0·0361	0·0148

Volumes Discharged in Cubic Mètres. Per Second.	Per Hour.	Volumes in English Feet per Second.	Mean Velocities in Mètres per Second.	Loss of Pressure for 1000 Mèters long, expressed in Mètres of Water. Air.	Gas.
0·022	79·2	0·777	1·245	0·0418	0·0171
0·024	86·4	0·848	1·358	0·0484	0·0198
0·026	93·6	0·918	1·471	0·0544	0·0223
0·028	100·8	0·989	1·584	0·0613	0·0251
0·030	108·0	1·059	1·692	0·0682	0·0280
0·032	115·2	1·130	1·811	0·0763	0·0312
0·034	122·4	1·201	1·924	0·0841	0·0344
0·036	129·6	1·271	2·037	0·0927	0·0380
0·038	136·8	1·342	2·150	0·1013	0·0415
0·040	144·0	1·413	2·263	0·1107	0·0453
0·042	152·0	1·483	2·376	0·1203	0·0493
0·044	158·4	1·554	2·490	0·1303	0·0534
0·046	165·6	1·625	2·603	0·1406	0·0576
0·048	172·8	1·695	2·716	0·1513	0·0620
0·050	180·0	1·766	2·829	0·1624	0·0665
0·055	198·0	1·942	3·112	0·1919	0·0787
0·060	216·0	2·119	3·395	0·2238	0·0917
0·065	234·0	2·296	3·678	0·2580	0·1057
0·070	252·0	2·472	3·961	0·2947	0·1208
0·075	270·0	2·649	4·244	0·3338	0·1368
0·080	288·0	2·825	4·527	0·3754	0·1539
0·085	306·0	3·002	4·810	0·4191	0·1718
0·090	324·0	3·179	5·093	0·4656	0·1909
0·095	342·0	3·355	5·376	0·5141	0·2107
0·100	360·0	3·532	5·659	0·5651	0·2317
0·105	378·0	3·708	5·941	0·6181	0·2534
0·110	396·0	3·885	6·224	0·6744	0·2765
0·115	414·0	4·061	6·507	0·7327	0·3004
0·120	432·0	4·238	6·790	0·7934	0·3253
0·125	450·0	4·415	7·073	0·8564	0·3511
0·130	468·0	4·591	7·356	0·9219	0·3780
0·140	504·0	4·944	7·922	1·0602	0·4346
0·150	540·0	5·298	8·488	1·2080	0·4952
0·160	576·0	5·651	9·054	1·3654	0·5598

Diameter = 0m·162. *Section* = 0m²·020612. *Coefficient* a = 0m·000410
Coefficient b = 0m·000420.

0·001	3·6	0·035	0·048	0·0006	0·0002
0·002	7·2	0·071	0·097	0·0013	0·0005
0·003	10·8	0·106	0·145	0·0021	0·0008
0·004	14·4	0·141	0·194	0·0030	0·0012
0·005	18·0	0·176	0·242	0·0038	0·0015
0·006	21·6	0·212	0·291	0·0049	0·0020
0·007	25·2	0·247	0·339	0·0059	0·0024
0·008	28·8	0·282	0·388	0·0070	0·0028
0·009	32·4	0·318	0·436	0·0082	0·0033
0·010	36·0	0·353	0·485	0·0094	0·0038
0·011	39·6	0·388	0·533	0·0107	0·0044
0·012	43·2	0·424	0·582	0·0121	0·0049
0·013	46·8	0·459	0·630	0·0135	0·0055
0·014	50·4	0·494	0·679	0·0150	0·0061
0·015	54·0	0·530	0·727	0·0165	0·0067
0·016	57·6	0·565	0·776	0·0181	0·0074
0·017	61·2	0·600	0·824	0·0197	0·0081
0·018	64·8	0·636	0·873	0·0215	0·0088
0·019	68·4	0·671	0·922	0·0233	0·0095
0·020	72·0	0·706	0·970	0·0252	0·0103
0·022	79·2	0·777	1·067	0·0292	0·0120
0·024	86·4	0·848	1·164	0·0332	0·0136
0·026	98·6	0·918	1·261	0·0377	0·0154
0·028	100·8	0·989	1·358	0·0423	0·0173
0·030	108·0	1·059	1·455	0·0473	0·0194
0·032	115·2	1·130	1·552	0·0524	0·0215
0·034	122·4	1·201	1·649	0·0579	0·0237
0·036	129·6	1·271	1·746	0·0635	0·0260
0·038	136·8	1·342	1·843	0·0694	0·0284
0·040	144·0	1·413	1·940	0·0756	0·0310
0·042	151·2	1·483	2·037	0·0821	0·0336
0·044	158·4	1·554	2·134	0·0887	0·0363
0·046	165·6	1·625	2·231	0·0957	0·0392
0·048	172·8	1·695	2·328	0·1028	0·0421
0·050	180·0	1·766	2·425	0·1103	0·0452
0·055	198·0	1·942	2·668	0·1300	0·0533
0·060	216·0	2·119	2·910	0·1513	0·0620
0·065	234·0	2·295	3·153	0·1741	0·0714
0·070	252·0	2·472	3·396	0·1987	0·0814
0·075	270·0	2·649	3·638	0·2249	0·0922
0·080	288·0	2·825	3·881	0·2531	0·1037
0·085	306·0	3·002	4·123	0·2814	0·1153
0·090	324·0	3·179	4·366	0·3129	0·1283
0·095	342·0	3·355	4·609	0·3445	0·1412
0·100	360·0	3·532	4·851	0·3791	0·1554
0·105	378·0	3·708	5·094	0·4139	0·1697
0·110	396·0	3·885	5·336	0·4517	0·1852
0·115	414·0	4·061	5·579	0·4895	0·2007
0·120	432·0	4·238	5·821	0·5305	0·2175
0·125	450·0	4·415	6·064	0·5715	0·2343
0·150	540·0	5·298	7·276	0·8039	0·3286
0·175	630·0	6·181	8·511	1·0812	0·4433
0·200	720·0	7·064	9·702	1·3874	0·5688
0·225	810·0	7·946	10·915	1·7383	0·7127

Diameter = 0m·189. *Section* = 0m²·028055. *Coefficient* a = 0m·000355.
Coefficient b = 0m·000405.

0·001	3·6	0·035	0·035	0·0003	0·0001
0·002	7·2	0·071	0·071	0·0007	0·0003
0·003	10·8	0·106	0·107	0·0011	0·0005

Volumes Discharged in Cubic Mètres. Per Second.	Per Hour.	Volumes in English Feet per Second.	Mean Velocities in Mètres per Second.	Loss of Pressure for 1000 Mètres long, expressed in Mètres of Water. Air.	Gas.
0·004	14·4	0·141	0·142	0·0015	0·0006
0·005	18·0	0·176	0·172	0·0020	0·0008
0·006	21·6	0·212	0·214	0·0025	0·0010
0·007	25·2	0·247	0·249	0·0031	0·0013
0·008	28·8	0·282	0·285	0·0036	0·0015
0·009	32·4	0·318	0·321	0·0042	0·0017
0·010	36·0	0·353	0·356	0·0048	0·0019
0·015	54·0	0·530	0·534	0·0083	0·0034
0·020	72·0	0·706	0·713	0·0127	0·0052
0·025	90·0	0·883	0·891	0·0173	0·0071
0·030	108·0	1·059	1·069	0·0231	0·0095
0·035	126·0	1·236	1·247	0·0291	0·0119
0·040	144·0	1·413	1·425	0·0364	0·0149
0·045	162·0	1·589	1·604	0·0438	0·0179
0·050	180·0	1·766	1·782	0·0524	0·0215
0·055	198·0	1·942	1·920	0·0612	0·0251
0·060	216·0	2·119	2·138	0·0713	0·0292
0·065	234·0	2·296	2·318	0·0815	0·0334
0·070	252·0	2·472	2·495	0·0929	0·0381
0·075	270·0	2·649	2·673	0·1044	0·0428
0·080	288·0	2·825	2·851	0·1172	0·0480
0·085	306·0	3·002	3·029	0·1302	0·0534
0·090	324·0	3·179	3·208	0·1443	0·0591
0·095	342·0	3·355	3·386	0·1589	0·0649
0·100	360·0	3·532	3·464	0·1742	0·0714
0·105	378·0	3·708	3·742	0·1903	0·0780
0·110	396·0	3·885	3·921	0·2071	0·0849
0·115	414·0	4·061	4·099	0·2248	0·0921
0·120	432·0	4·238	4·277	0·2427	0·0995
0·125	450·0	4·415	4·455	0·2615	0·1072
0·130	468·0	4·591	4·623	0·2810	0·1152
0·135	486·0	4·768	4·812	0·3016	0·1236
0·140	504·0	4·944	4·990	0·3223	0·1321
0·145	522·0	5·121	5·168	0·3442	0·1411
0·150	540·0	5·298	5·346	0·3662	0·1501
0·155	558·0	5·474	5·525	0·3894	0·1596
0·160	576·0	5·651	5·703	0·4130	0·1693
0·165	594·0	5·827	5·881	0·4376	0·1794
0·170	612·0	6·004	6·059	0·4626	0·1896
0·175	630·0	6·181	6·237	0·4886	0·2003
0·180	648·0	6·357	6·416	0·5150	0·2111
0·185	666·0	6·534	6·594	0·5423	0·2223
0·190	684·0	6·710	6·772	0·5701	0·2337
0·195	702·0	6·887	6·950	0·5987	0·2454
0·200	720·0	7·064	7·129	0·6282	0·2575
0·210	756·0	7·417	7·484	0·6887	0·2823
0·220	792·0	7·770	7·842	0·7525	0·3085
0·230	828·0	8·123	8·198	0·8187	0·3356
0·240	864·0	8·476	8·554	0·8878	0·3640
0·250	900·0	8·829	8·910	0·9555	0·3917
0·260	936·0	9·183	9·266	1·0343	0·4240

Diameter = 0m·200. *Section* = 0m²·031416. *Coefficient* a = 0m·000330.
Coefficient b = 0·000395.

0·001	3·6	0·035	0·032	0·0003	0·0001
0·002	7·2	0·071	0·063	0·0005	0·0002
0·003	10·8	0·106	0·095	0·0009	0·0004
0·004	14·4	0·141	0·127	0·0012	0·0005
0·005	18·0	0·176	0·159	0·0015	0·0006
0·006	21·6	0·212	0·191	0·0019	0·0008
0·007	25·2	0·247	0·223	0·0023	0·0009
0·008	28·8	0·282	0·254	0·0028	0·0011
0·009	32·4	0·318	0·286	0·0032	0·0013
0·010	36·0	0·353	0·318	0·0037	0·0015
0·015	54·0	0·530	0·477	0·0063	0·0026
0·020	72·0	0·706	0·636	0·0094	0·0038
0·025	90·0	0·883	0·795	0·0130	0·0053
0·030	108·0	1·059	0·954	0·0172	0·0070
0·035	126·0	1·236	1·114	0·0219	0·0090
0·040	144·0	1·413	1·273	0·0270	0·0110
0·045	162·0	1·589	1·432	0·0326	0·0133
0·050	180·0	1·766	1·591	0·0388	0·0159
0·055	198·0	1·942	1·750	0·0455	0·0186
0·060	216·0	2·119	1·911	0·0527	0·0216
0·065	234·0	2·296	2·069	0·0604	0·0247
0·070	252·0	2·472	2·228	0·0685	0·0281
0·075	270·0	2·649	2·387	0·0773	0·0317
0·080	288·0	2·825	2·547	0·0864	0·0354
0·085	306·0	3·002	2·706	0·0962	0·0394
0·090	324·0	3·179	2·865	0·1064	0·0436
0·095	342·0	3·355	3·024	0·1171	0·0480
0·100	360·0	3·532	3·183	0·1283	0·0526
0·105	378·0	3·708	3·343	0·1401	0·0574
0·110	396·0	3·885	3·502	0·1524	0·0625
0·115	414·0	4·061	3·661	0·1652	0·0677
0·120	432·0	4·238	3·823	0·1786	0·0732
0·125	450·0	4·415	3·978	0·1922	0·0788
0·130	468·0	4·591	4·138	0·2064	0·0846
0·135	486·0	4·768	4·298	0·2212	0·0907
0·140	504·0	4·944	4·457	0·2365	0·0970
0·145	522·0	5·121	4·616	0·2521	0·1033
0·150	540·0	5·298	4·774	0·2685	0·1100
0·155	558·0	5·474	4·935	0·2854	0·1170
0·160	576·0	5·651	5·094	0·3027	0·1241
0·165	594·0	5·827	5·253	0·3205	0·1314
0·170	612·0	6·004	5·412	0·3389	0·1389
0·175	630·0	6·181	5·570	0·3577	0·1466

Volumes Discharged in Cubic Mètres. Per Second.	Per Hour.	Volumes in English Feet per Second.	Mean Velocities in Mètres per Second.	Loss of Pressure for 1000 Mètres long, expressed in Mètres of Water. Air.	Gas.
0·180	648·0	6·357	5·731	0·3771	0·1546
0·185	666·0	6·534	5·890	0·3969	0·1627
0·190	684·0	6·710	6·049	0·4174	0·1711
0·195	702·0	6·887	6·208	0·4371	0·1792
0·200	720·0	7·064	6·366	0·4594	0·1883
0·210	756·0	7·417	6·686	0·5039	0·2066
0·220	792·0	7·770	7·004	0·5501	0·2255
0·230	828·0	8·123	7·322	0·5983	0·2453
0·240	864·0	8·476	7·646	0·6496	0·2663
0·250	900·0	8·829	7·956	0·7006	0·2872
0·260	936·0	9·183	8·276	0·7543	0·3092

Diameter = 0m·216. *Section* = 0m2·036644. *Coefficient* a = 0m·000300. *Coefficient* b = 0m·000382.

0·001	3·6	0·035	0·027	0·0002	0·0001
0·002	7·2	0·071	0·054	0·0004	0·0002
0·003	10·8	0·106	0·081	0·0006	0·0003
0·004	14·4	0·141	0·109	0·0009	0·0004
0·005	18·0	0·176	0·136	0·0011	0·0005
0·006	21·6	0·212	0·163	0·0014	0·0006
0·007	25·2	0·247	0·191	0·0017	0·0007
0·008	28·8	0·282	0·218	0·0020	0·0008
0·009	32·4	0·318	0·245	0·0023	0·0009
0·010	36·0	0·353	0·273	0·0026	0·0011
0·015	54·0	0·530	0·409	0·0045	0·0018
0·020	72·0	0·706	0·545	0·0065	0·0026
0·025	90·0	0·883	0·682	0·0090	0·0037
0·030	108·0	1·059	0·818	0·0119	0·0049
0·035	126·0	1·236	0·955	0·0150	0·0061
0·040	144·0	1·413	1·091	0·0185	0·0076
0·045	162·0	1·589	1·228	0·0223	0·0091
0·050	180·0	1·766	1·364	0·0265	0·0108
0·055	198·0	1·942	1·500	0·0310	0·0127
0·060	216·0	2·119	1·637	0·0359	0·0147
0·065	234·0	2·296	1·873	0·0410	0·0168
0·070	252·0	2·472	1·910	0·0465	0·0190
0·075	270·0	2·649	2·046	0·0523	0·0214
0·080	288·0	2·825	2·183	0·0586	0·0240
0·085	306·0	3·002	2·319	0·0650	0·0266
0·090	324·0	3·179	2·456	0·0718	0·0294
0·095	342·0	3·355	2·592	0·0791	0·0324
0·100	360·0	3·532	2·729	0·0866	0·0355
0·105	378·0	3·708	2·865	0·0945	0·0387
0·110	396·0	3·885	3·001	0·1026	0·0410
0·115	414·0	4·061	3·138	0·1112	0·0456
0·120	432·0	4·238	3·274	0·1200	0·0492
0·125	450·0	4·415	3·411	0·1293	0·0530
0·130	468·0	4·591	3·547	0·1387	0·0568
0·135	486·0	4·768	3·684	0·1486	0·0609
0·140	504·0	4·944	3·820	0·1588	0·0651
0·145	522·0	5·121	3·957	0·1695	0·0695
0·150	540·0	5·298	4·093	0·1802	0·0739
0·155	558·0	5·474	4·230	0·1915	0·0785
0·160	576·0	5·651	4·366	0·2029	0·0832
0·165	594·0	5·827	4·502	0·2149	0·0881
0·170	612·0	6·004	4·639	0·2270	0·0930
0·175	630·0	6·181	4·775	0·2397	0·0983
0·180	648·0	6·357	4·912	0·2525	0·1035
0·185	666·0	6·534	5·048	0·2659	0·1090
0·190	684·0	6·710	5·185	0·2793	0·1145
0·195	702·0	6·887	5·321	0·2933	0·1202
0·200	720·0	7·064	5·458	0·3073	0·1260
0·220	792·0	7·770	6·002	0·3674	0·1506
0·240	864·0	8·476	6·548	0·4330	0·1776
0·260	936·0	9·183	7·094	0·5040	0·2066
0·280	1008·0	9·889	7·640	0·5803	0·2379
0·300	1080·0	10·595	8·186	0·6620	0·2714
0·320	1152·0	11·302	8·732	0·7491	0·3071

Diameter = 0m·243. *Section* = 0m2·046377. *Coefficient* a = 0m·000257. *Coefficient* b = 0m·000362.

0·005	18	0·176	0·108	0·0007	0·0003
0·010	36	0·353	0·216	0·0015	0·0006
0·015	54	0·530	0·323	0·0025	0·0010
0·020	72	0·706	0·431	0·0038	0·0015
0·025	90	0·883	0·539	0·0052	0·0021
0·030	108	1·059	0·647	0·0068	0·0028
0·035	126	1·236	0·754	0·0085	0·0034
0·040	144	1·413	0·862	0·0105	0·0043
0·045	162	1·589	0·970	0·0125	0·0051
0·050	180	1·766	1·078	0·0149	0·0061
0·055	198	1·942	1·186	0·0173	0·0071
0·060	216	2·119	1·293	0·0199	0·0082
0·065	234	2·296	1·403	0·0228	0·0094
0·070	252	2·472	1·509	0·0258	0·0105
0·075	270	2·649	1·617	0·0290	0·0119
0·080	288	2·825	1·725	0·0323	0·0132
0·085	306	3·002	1·833	0·0358	0·0147
0·090	324	3·179	1·940	0·0396	0·0162
0·095	342	3·355	2·048	0·0435	0·0178
0·100	360	3·532	2·156	0·0476	0·0185
0·105	378	3·708	2·264	0·0519	0·0213
0·110	396	3·885	2·372	0·0563	0·0231
0·115	414	4·061	2·479	0·0609	0·0250
0·120	432	4·238	2·587	0·0657	0·0269
0·125	450	4·415	2·695	0·0707	0·0290
0·130	468	4·591	2·803	0·0759	0·0311

Volumes Discharged in Cubic Mètres. Per Second.	Per Hour.	Volumes in English Feet per Second.	Mean Velocities in Mètres per Second.	Loss of Pressure for 1000 Mètres long, expressed in Mètres of Water. Air.	Gas.
0·135	486	4·768	2·911	0·0812	0·0333
0·140	504	4·944	3·018	0·0867	0·0355
0·145	522	5·121	3·126	0·0923	0·0376
0·150	540	5·298	3·234	0·0982	0·0402
0·155	558	5·474	3·342	0·1044	0·0426
0·160	576	5·651	3·450	0·1105	0·0450
0·165	594	5·827	3·557	0·1170	0·0480
0·170	612	6·004	3·665	0·1235	0·0506
0·175	630	6·181	3·773	0·1303	0·0534
0·180	648	6·357	3·881	0·1372	0·0562
0·185	666	6·534	3·989	0·1444	0·0592
0·190	684	6·710	4·097	0·1517	0·0622
0·195	702	6·887	4·204	0·1592	0·0652
0·200	720	7·064	4·312	0·1668	0·0684
0·210	756	7·417	4·528	0·1827	0·0746
0·220	792	7·770	4·744	0·1993	0·0817
0·230	828	8·123	4·959	0·2166	0·0888
0·240	864	8·476	5·175	0·2346	0·0962
0·250	900	8·829	5·390	0·2534	0·1039
0·260	936	9·183	5·606	0·2728	0·1218
0·270	972	9·536	5·822	0·2930	0·1201
0·280	1008	9·889	6·037	0·3138	0·1286
0·290	1044	10·242	6·253	0·3354	0·1375
0·300	1080	10·595	6·468	0·3576	0·1466
0·350	1260	12·361	7·546	0·4799	0·1967
0·400	1440	14·127	8·624	0·6200	0·2542
0·450	1620	15·893	9·700	0·7777	0·3196
0·500	1800	17·659	10·780	0·9540	0·3911

Diameter = 0m·250. *Section* = 0m2·049087. *Coefficient* a = 0m·000240. *Coefficient* b = 0m·000360.

0·005	18	0·176	0·101	0·0005	0·0002
0·010	36	0·353	0·203	0·0013	0·0005
0·015	54	0·530	0·305	0·0022	0·0009
0·020	72	0·706	0·407	0·0032	0·0013
0·025	90	0·883	0·509	0·0044	0·0018
0·030	108	1·059	0·611	0·0057	0·0023
0·035	126	1·236	0·713	0·0073	0·0030
0·040	144	1·413	0·814	0·0089	0·0036
0·045	162	1·589	0·916	0·0108	0·0044
0·050	180	1·766	1·018	0·0127	0·0052
0·055	198	1·942	1·120	0·0149	0·0061
0·060	216	2·119	1·222	0·0171	0·0070
0·065	234	2·296	1·324	0·0195	0·0080
0·070	252	2·472	1·426	0·0221	0·0091
0·075	270	2·649	1·527	0·0249	0·0102
0·080	288	2·825	1·629	0·0277	0·0114
0·085	306	3·002	1·731	0·0308	0·0126
0·090	324	3·179	1·833	0·0340	0·0139
0·095	342	3·355	1·935	0·0374	0·0154
0·100	360	3·532	2·037	0·0409	0·0168
0·105	378	3·708	2·139	0·0445	0·0182
0·110	396	3·885	2·240	0·0483	0·0199
0·115	414	4·061	2·342	0·0523	0·0214
0·120	432	4·238	2·444	0·0564	0·0231
0·125	450	4·415	2·546	0·0607	0·0247
0·130	468	4·591	2·648	0·0651	0·0267
0·135	486	4·768	2·750	0·0696	0·0285
0·140	504	4·944	2·852	0·0744	0·0305
0·145	522	5·121	2·953	0·0793	0·0325
0·150	540	5·298	3·055	0·0848	0·0347
0·155	558	5·474	3·157	0·0895	0·0367
0·160	576	5·651	3·259	0·0949	0·0389
0·165	594	5·827	3·361	0·1006	0·0412
0·170	612	6·004	3·463	0·1060	0·0434
0·175	630	6·181	3·565	0·1116	0·0457
0·180	648	6·357	3·666	0·1178	0·0483
0·185	666	6·534	3·768	0·1237	0·0507
0·190	684	6·710	3·870	0·1302	0·0533
0·195	702	6·887	3·972	0·1366	0·0560
0·200	720	7·064	4·074	0·1432	0·0587
0·210	756	7·417	4·278	0·1568	0·0643
0·220	792	7·770	4·481	0·1710	0·0701
0·230	828	8·123	4·685	0·1858	0·0761
0·240	864	8·476	4·889	0·2013	0·0825
0·250	900	8·829	5·092	0·2173	0·0891
0·260	936	9·183	5·296	0·2340	0·0959
0·270	972	9·536	5·500	0·2513	0·1030
0·280	1008	9·889	5·704	0·2693	0·1104
0·290	1044	10·242	5·907	0·2878	0·1180
0·300	1080	10·595	6·111	0·3069	0·1258
0·350	1260	13·361	7·130	0·4118	0·1688
0·400	1440	14·127	8·148	0·5320	0·2181
0·450	1620	15·893	9·165	0·6674	0·2736
0·500	1800	17·659	10·184	0·8184	0·3355

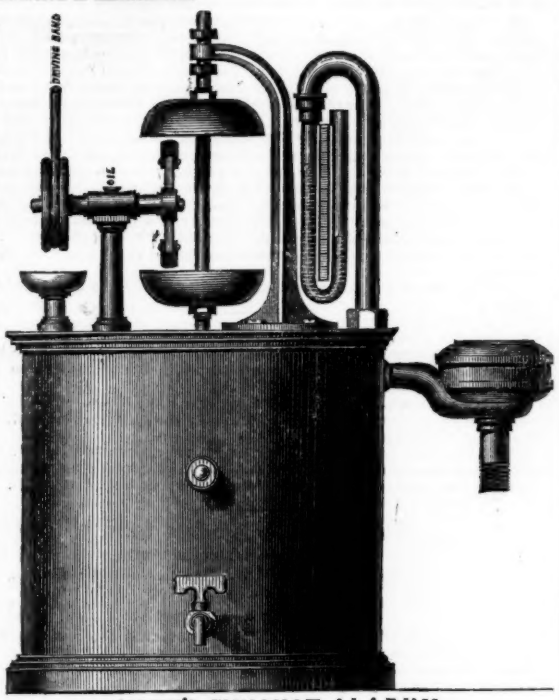
(*To be continued.*)

MANN'S EXHAUST ALARUM.

The annexed engraving illustrates an instrument contrived by Mr. Mann, and used at the City of London Gas-Works, called an Exhaust Alarum. It is exceedingly sensitive and simple, and can be described in few words.

Two bells are fixed at such a distance apart on a float-rod that a centrifugal hammer can revolve between them without striking; but should the vacuum increase, the float descends and the

hammers strike the upper bell; should the vacuum decrease, the lower bell is struck. In either case the ringing is continued until the engines are set to the speed to produce the necessary exhaustion. The bells will then return to their silent position as in the drawing, and remain silent as long as the proper exhaustion is maintained.



MANN'S EXHAUST ALARUM.
Scale ¼ Full Size.

This little machine works well, with no other attention, after being once set to the working vacuum, than a drop of oil to the bearing of the hammer arbor. The hammers are driven by a band or gut from any running gear.

One of Sugg's regulators, fixed on the exhaust-pipe, that will close at three inches pressure, obviates the necessity of making the cistern in which the float works unreasonably deep, to prevent overflow when the engines stop.

We are preparing for publication a drawing and description of an instrument in use at the above works, which on one cylinder draws a diagram of the amount of exhaustion on the retorts, the attention of the stokers to the gauge-cocks of the boilers, and also the hour and time occupied in testing the gas at the outlet-main of the purifiers.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1056.—William Edward Newton, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in engines for obtaining motive power by means of steam, air, gases, or fluids.*" A communication. March 27, 1868.

1058.—James Grafton Jones, of the Blaina Iron-Works, near Newport, in the co. of Monmouth, for "*Improvements in apparatus for hauling minerals in mines, and for raising water from mines and other places.*" March 27, 1868.

1059.—Walter Watson Hughes, of 48, Porchester Terrace, in the co. of Middlesex, for "*Improvements in propelling vessels and in forcing water.*" March 27, 1868.

1066.—Charles Joyner, of Birmingham, in the co. of Warwick, manufacturer, for "*Improvements in water-slide gaseliers.*" March 28, 1868.

1070.—William Robert Lake, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in filters.*" A communication. March 28, 1868.

1082.—Andrew Barclay Walker, of Warrington, in the co. of Lancashire, brewer, for "*Improvements in the application of hot blast or heated air for evaporating salt brine and other liquids, sugar, or chemicals; also for heating gas and oil retorts, raising steam in boilers, boiling worts in breweries and distilleries; which improvements are also applicable for bleaching, tanning, and baking.*" March 30, 1868.

1090.—Miles Hawthornthwaite, of Lancaster, clerk, and Thomas Abbott, of Lancaster, plumber, both of the co. of Lancaster, for "*Improvements in taps, cocks, valves, &c., for water, gas, steam, or other liquids.*" March 31, 1868.

1094.—John Henry Weston, of Kennington Road, in the co. of Surrey, gas engineer, for "*Improvements in the means or apparatus for lighting and ventilating the interior of buildings, combining a decorative effect.*" March 31, 1868.

1122.—Augustus De Metz, of Wolverhampton, in the co. of Stafford, manufacturer, for "*Improvements in commodes or vessels to be used as water-closets, expectorating utensils, or for other purposes.*" April 3, 1868.

1128.—Cyrus W. Baldwin, of Boston, in the co. of Suffolk and state of Massachusetts, U.S.A., for "*A new and useful device or instrument for measuring and registering the amount of a flowing liquid.*" (Complete specification.) April 3, 1868.

1131.—Jerome Valentine Jones and George James Williams, both of Birmingham, in the co. of Warwick, manufacturers, for "*Improvements in the manufacture of ornamental metallic tubes.*" April 3, 1868.

1134.—John Garrett Tongue, of the firm of Tongue and Birkbeck, of 34, Southampton Buildings, Chancery Lane, in the co. of Middlesex, patent agents and engineers, for "*Improvements in lamps or apparatus for lighting or illuminating purposes.*" A communication. April 3, 1868.

1151.—Eugene Hay, of 83, Lombard Street, in the City of London, for "*Improvements in means or apparatus for measuring and indicating the passage or flow of liquids.*" A communication. April 6, 1868.

1152.—James Dunbar, of 49, Vicarage Road, Camberwell, S.E., engineer, and Richard Nicholson, Dulwich, S.E., gentleman, all in the co. of Surrey, for "*Improvements in machinery for inserting and depositing coal, cannel, or other substances into gas-retorts or other ovens, and for withdrawing the same after distillation; also for retort mouthpieces, chambers, doors, and covers or lids.*" April 6, 1868.

1172.—Charles William Siemens, of 3, Great George Street, Westminster, in the co. of Middlesex, for "*Improvements in the application of gas-furnaces to evaporating, smelting, puddling, and other manufacturing purposes.*" April 7, 1868.

GRANTS OF PROVISIONAL PROTECTION.

118.—William Firth, of Rose Villa, Viewforth, Edinburgh, in the co. of Mid Lothian, for "*Improvements in valves made from india-rubber or other similar elastic material, the said valves being applicable in the construction of fluid or gaseous pumps, enemas, syringes, spray-producers, and other instruments where valves are in use.*" Jan. 13, 1868.

898.—Robert Smith, of Compton Road, Islington, in the co. of Middlesex, for "*Improvements in the means and apparatus for extracting foul air or gases from mines, sewers, brewers vats, and other places.*" March 17, 1868.

915.—Claude François Constant Cretin-Borne, of Glasgow, in the co. of Lanark, for "*Improved means or apparatus for ventilating or supplying air to mines and other places.*" March 18, 1868.

923.—Benjamin Edward Reina Newlands, F.C.S., of 4, Malvern Terrace, Charlton, in the co. of Kent, for "*Improvements in treating and obtaining products from spent oxide of iron which has been used in gas-works or otherwise, to separate sulphur from sulphuretted hydrogen, and in the purification of sulphur obtained from such oxide of iron.*" March 18, 1868.

966.—Josiah George Jennings, of Palace Wharf, Lambeth, in the co. of Surrey, sanitary engineer, for "*Improvements in water-closets, and in apparatus for supplying water, and in sewers or drains for receiving the same.*" March 21, 1868.

969.—Edward Kenworthy Dutton, of 3, Smithy Door, Manchester, in the co. of Lancaster, consulting engineer, for "*Improvements in valves employed to regulate the flow of water.*" March 23, 1868.

976.—Julius Brönner, of Frankfort-on-the-Maine, in the kingdom of Prussia, manufacturer, for "*Improvements in the construction of gas-burners.*" March 23, 1868.

1002.—Joshua Antill, of Wandsworth, in the co. of Surrey, plasterer, for "*Improvements in stench-traps.*" March 24, 1868.

1031.—William Henry Saint Aubin, of Wolverhampton, in the co. of Stafford, machinist, for "*Improvements in and additions to cocks and taps for drawing off liquids and gases from pipes, casks, or other vessels, which improvements and additions may also be applied to cocks and taps for filling vessels.*" March 26, 1868.

1033.—Henry Davey, of 9, Victoria Chambers, in the city of Westminster, engineer, for "*Improvements in steam-engines, part of which is applicable to steam-pumps.*" March 26, 1868.

1056.—William Edward Newton, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in engines for obtaining motive power by means of steam, air, gases, or fluids.*" A communication. March 27, 1868.

1066.—Charles Joyner, of Birmingham, in the co. of Warwick, manufacturer, for "*Improvements in water-slide gaseliers.*" March 28, 1868.

1070.—William Robert Lake, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in filters.*" A communication. March 28, 1868.

1084.—James Walker, engineer, and John Wharrie, foreman iron-founder, both of Glasgow, in the co. of Lanark, N.B., for "*Improvements in apparatus for the manufacture of cast-iron pipes and similar articles.*" March 29, 1868.

INVENTION PROTECTED FOR SIX MONTHS BY THE DEPOSIT OF A COMPLETE SPECIFICATION.

1128.—Cyrus W. Baldwin, of Boston, in the co. of Suffolk and state of Massachusetts, U.S.A., for "*A new and useful device or instrument for measuring and registering the amount of a flowing liquid.*" April 3, 1868.

NOTICES TO PROCEED.

3318.—Peter Salmon, of 6, Great Smith Street, Westminster, in the co. of Middlesex, engineer, for "*Improvements in the manufacture of gas, and in the treatment and application of such and other gases for cooking, warming, lighting, generating of steam, and other purposes, combined with their use as a motive power, previous to being burned or consumed, and improvements in the apparatus for these purposes.*" Nov. 23, 1867.

3397.—JOHN JOSEPH PARKES, of London Street, Paddington, in the co. of Middlesex, gas engineer, for "*Improvements in the means of ventilating rooms and buildings, and in apparatus for the same.*" Nov. 29, 1867.

3491.—CHARLES MATHEW BARKER, of 12, Kennington Park Road, in the co. of Surrey, engineer, for "*Improvements in socket and flange spigot-pipes.*" Dec. 7, 1867.

891.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in the manufacture of illuminating gas in the distillation of hydrocarbons and the making of gaseous fuel for heating purposes.*" A communication. March 16, 1868.

923.—BENJAMIN EDWARD REINA NEWLANDS, F.C.S., of 4, Malvern Terrace, Charlton, in the co. of Kent, for "*Improvements in treating and obtaining products from spent oxide of iron which has been used in gas-works or otherwise, to separate sulphur from sulphuretted hydrogen, and in the purification of sulphur obtained from such oxide of iron.*" March 18, 1868.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

809.—WILLIAM MORRANT BAKER, "*Improvements in Argand gas-burners.*" March 22, 1865.

841.—GIACOMO FELICE MARCHISIO, "*Improvements in apparatus for obtaining light.*" March 24, 1865.

917.—JAMES BATHGATE, "*Improvements in gas-meters, and in the machinery or apparatus connected therewith.*" March 31, 1865.

943.—CHARLES DENOON YOUNG, "*Improvements in double-acting lift and force pumps.*" April 4, 1865.

949.—WILLIAM BROOKES, "*Improvements in means or apparatus for obtaining motive power by the aid of steam, gas, or other fluids.*" April 4, 1865.

951.—ROBERT BAYNES, "*Improvements in suction and force pumps.*" April 4, 1865.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

749.—WILLIAM BROOKES, "*Improvements in means or apparatus for measuring gas.*" March 25, 1861.

769.—JACOB GEOGHEGAN WILLANS, "*Improvements in the preparation of hydrated oxide of iron, and the application of such prepared oxide for the absorption or separation of sulphur from certain gases.*" March 27, 1861.

Parliamentary Intelligence.

HOUSE OF LORDS.

FRIDAY, APRIL 3.

The LOUGHBOROUGH GAS Bill was read the first time, and referred to the Examiners.

HOUSE OF COMMONS.

MONDAY, MARCH 30.

The LOUGHBOROUGH GAS Bill, as amended, was considered.

The EASTBOURNE GAS Bill was reported.

TUESDAY, MARCH 31.

The GRAND JUNCTION WATER; BURSLEM AND TUNSTALL GAS; and the RUTHIN WATER Bills, were reported.

The LEWES WATER Bill was read the first time, and referred to the Examiners of Petitions for Private Bills.

The CHICHESTER GAS; WORTHING GAS; PETERBOROUGH GAS; LLYNVI VALLEY GAS; and the YSTRAD GAS AND WATER Bills, are referred to a Select Committee, consisting of Lord George Cavendish (chairman), Sir William Bagge, Mr. Sykes, and Mr. T. T. Paget, who will sit on Tuesday, April 21, at twelve o'clock.

THURSDAY, APRIL 2.

The CORK GAS, and the HYTHE AND SANDGATE GAS Bills, were reported.

The LOUGHBOROUGH GAS Bill was read a third time, and passed.

The CLEVEDON GAS Bill, as amended, was considered.

METROPOLIS GAS BILL.

Mr. MORRISON: In moving that this Bill be read a second time, I may explain to the House that in 1866 a hybrid committee was appointed upon the subject, and on its report the Government founded the Bill of last session, which was referred to a committee of five; and, after a lengthened and expensive inquiry, it miscarried at a time when the representatives of the companies and those of the public appeared to have come as nearly as possible to an agreement. It was, therefore, thought expedient that the Bill should be reintroduced this year; and the Bill which I now move the second reading of is, in the main, a reprint of the Bill of last year, up to the point which it reached in the committee. Very grave exceptions have been taken to certain parts of this Bill, but, having had a conference with gentlemen who represent the gas companies of the metropolis, they have determined to offer no opposition to the Bill, on the condition that the promoters—for, though this is treated as a public bill, it is in reality a private bill—making certain alterations; and I am prepared on the part of the promoters to agree to those alterations, which involve the striking out of a large portion of the matter not contained in the bill of last year. This includes all the clauses that deal with the supply in bulk; the power of the local authorities to buy the gas in bulk; the substitution of the power of permissive purchase by the local authorities in place of the compulsory power of purchase; and, finally, making a slight alteration in reference to charging on the dividend any damages that may be recovered on account of any accident. I should mention that there is already an order of this House that all the bills in reference to the supply of gas to the metropolis should be referred to the same committee. Several other bills have been already read a second time and referred to that committee; and, as the committee has proceeded with them, it is desirable that there should be no further delay, and I should have been glad to have moved that this bill be committed to-night in order to introduce these amendments; but I understand from high authority that that is not the practice of this House, and I therefore move that the bill be now read a second time, and then I will move that the bill be committed to-morrow for the purpose of inserting the amendments that have been agreed upon between the promoters and the gentlemen who represent the gas companies.

Mr. GREENE: I have remained in the House for the purpose of opposing this bill; but, in consequence of the arrangement that has been come to, I shall not do so, but wait until the committee have reported.

Mr. WYLD: The honourable member says that this is, to some extent, a private bill; but the 100th clause says, "All costs, charges, and expenses, preliminary to, and of and incidental to, the preparing, applying for, obtaining, and passing of this Act, including those incurred by the Board of Trade in relation to the Metropolis Gas Bill introduced in the first session of Parliament in the year 1867, shall be paid by the Metropolitan Board of Works as the Board of Trade direct." Now, I object to this clause, and I believe that a very large portion of the representative body of this metropolis will object to paying out of the rates the expenses incurred in the prosecution of the bill of 1867. I do not know whether this is the proper time to make that objection, but I think that the ratepayers of the metropolis ought not to be taxed to pay the expenses of a bill which a committee of this House did not pass. I think this matter requires some investigation, and, if it does not meet with proper attention at the hands of the committee, I shall move the rejection of the clause when the bill comes up for the third reading.

The bill was then read a second time, and ordered to be committed to-morrow.

FRIDAY, APRIL 3.

The METROPOLIS GAS Bill was considered in committee, and certain amendments inserted. The Bill was reported, and recommitted to the Select Committee on the Metropolis Gas Bills.

The Select Committee on the METROPOLIS GAS Bills is appointed as follows:—Mr. Cardwell (chairman), Mr. John Hardy, Mr. John Peel, Mr. Holland, and Mr. Greene.

The following are the private Bills referred to the committee:—GASLIGHT AND COKE COMPANY'S Bill; IMPERIAL GAS Bill; LONDON (CORPORATION) GAS Bill; and METROPOLITAN GAS COMPANIES AMALGAMATION Bill.

HOUSE OF COMMONS.

MONDAY, MARCH 30.

(*Before Mr.* MONK, *Chairman; Lord* BINGHAM, *Captain* HAYTER, *and Mr.* HARVEY, *and Mr.* BONHAM-CARTER, *Referee.*)

EASTBOURNE GAS BILL.

Mr. RICHARDS, Q.C., appeared for the promoters; and Mr. MERRIWETHER, Q.C., and Mr. LANG opposed on behalf of the London, Brighton, and South Coast Railway Company.

Mr. RICHARDS said that the bill was entitled "A bill for incorporating the Eastbourne Gas Company, and for conferring upon them further powers for the supply of gas to the town and parish of Eastbourne and the parish of Willingdon, in the county of Sussex, and for other purposes." It was, in short, a bill to incorporate an existing company, and was of quite an ordinary character. The preamble was extremely short, and gave the existing state of circumstances. It stated that "Whereas, by a Deed of Settlement, dated the 3rd day of April, 1852, a company or copartnership, called the Eastbourne Gas Company, was established for the purpose of supplying gas within the town and parish of Eastbourne, in the county of Sussex; and whereas the company so established purchased lands in the parish of Eastbourne, and thereon erected gas-works, and laid down mains and pipes, and are now lighting with gas the said town and parish; and whereas the capital of the company is £20,000, divided into 2000 shares of £10 each; and whereas 1150 shares in the capital of the company have been fully paid up; and whereas the company have no mortgage debt." The company, in fact, had no debt at all, they were entirely free; but they were driven to come to Parliament to ask for powers to increase their capital and to erect additional works in consequence of the increase of the population of the town and district. No doubt some of the committee knew Eastbourne; at all events they were all aware of the fact that it was one of those fashionable watering places, the population of which of late years had prodigiously increased—indeed, it had something like trebled itself, and of course the demand for gas had comparatively increased. The supply from the present works had threatened to become totally insufficient, and the gas company, therefore, came before the committee asking to be incorporated, and also for additional powers to be granted to them for increasing their capital and for borrowing money. By clause 4 the limits of their Act with respect to the supply were to comprise and include the town of Eastbourne and the parish of Willingdon, where it was proposed to erect new works; and by clause 56 the highest charge for the gas supplied by the company was never to exceed 5s. per 1000 cubic feet. Clause 57 established the minimum illuminating power at 14-candle gas, and he had to congratulate the committee upon the fact that none of these matters gave any dissatisfaction to the public of Eastbourne, as both the maximum of price and the minimum of illuminating power were completely satisfactory, as well as the clauses about the purity of the gas. The new capital which it was proposed to raise by clause 23 was £30,000, and there was a manuscript clause which limited the dividend upon the capital so raised to 7 per cent. on the ordinary shares, and 6 per cent. actually paid up of such capital on preference shares. There was also a clause for borrowing £5000 as against the existing old capital of £20,000, and further power to borrow £1250 in respect of each successive £5000 of the new capital as it was raised, so that when the whole £30,000 was raised there would be power to borrow £7500. He would mention that that power to borrow one-fourth of the amount of capital was almost the invariable rule in gas bills. By clause 39 it was asked for power to take certain lands delineated on the deposited plans, and, with regard to those lands, he was happy to say they belonged to the Duke of Devonshire, who consented to their being so taken, and no difficulty would arise on that point. When the new works were built in the parish of Willingdon the manufacture of gas would be removed to a greater distance from the town of Eastbourne than at present, and of course that would be a great advantage to a place such as that was, where a large number of visitors were in the habit of assembling. It was then proposed, when the new works were erected, by clause 44, to enable the company to sell by auction or by private contract the site of the existing works—the land on which they stood. All the other clauses of the bill, he believed, were of the most simple and ordinary character, such clauses as were invariably to be found whenever an unincorporated company came before Parliament and sought to be incorporated. Originally there were two petitions against the bill—one by the

Local Board of Health—but he was happy to say that amendments and alteration clauses had been introduced into the bill which were satisfactory to those gentlemen, and they had withdrawn their petition accordingly. The remaining petition was that of the London, Brighton, and South Coast Railway Company, who complained that under the powers of the bill a tramway constructed by them, and of which they were lessees under the Duke of Devonshire, and for which they were paying a minimum rent amounting to £200 per annum, might be compulsorily taken; the promoters, however, had inserted a clause to the effect that it should not be lawful for the company to enter upon, take, or use the tramway named in the deposited plans, in the parish of Willingdon, without the previous consent in writing of the owner and lessee for the time being of that tramway. That was what they proposed to do, and he could not help thinking it must be perfectly satisfactory to the railway company. He was told, though he did not know with what truth, that the interest of the railway company in that tramway was that of lessees, and for a short time only.

Mr. LANG said that the company were satisfied with the clause as amended.

Mr. RICHARDS said the petitioners further alleged that it would be highly disadvantageous to the public and themselves if the promoters were permitted in any way to interfere with the railway works or property. With reference to this, they proposed to introduce a manuscript clause which he thought would be satisfactory to the company. By that clause it was provided that any works constructed by the promoters in any way affecting the railway should be carried out under the superintendence and to the satisfaction of their engineer, and that proper compensation should be made by the promoters for any injury or inconvenience occasioned by them. This was an ordinary clause, and, as far as his experience went, was more in favour of the railway company than such clauses generally were. The next paragraph in the petition stated, "That the bill also proposes to empower the gas company to sell and dispose of their existing gas-works, and the site thereof, by auction or by private contract." This he apprehended to be really the contention in the bill—"That the said site was taken out of lands belonging to petitioners, and is surrounded on all sides but one by your petitioners property, which, for the public convenience and the due accommodation of your petitioners traffic, it will be necessary shortly to appropriate for increased station accommodation. That in order duly to effect such appropriation and accommodation, it is essential that provision be made for the sale to your petitioners of the said site of the existing gas-works, and the sale thereof to any one but your petitioners would be prejudicial to your petitioners, and would hinder them in giving the public due accommodation." In other words, the Brighton Company had sold land to the promoters which, he was told, they originally bought from certain persons known as Gilbert's trustees, and that the land was sold in two lots by them. No opportunity of pre-emption was offered by the trustees to the railway company, who, when they sold the land to the promoters, might have reserved to themselves such a right in their Deed of Conveyance; but they did not do so. They did not put it on such ground as that; they sold the land to the promoters with a right of pre-emption, but they said that inasmuch as the land which they originally sold to the gas company was desirable for the purpose of increasing their station accommodation, they ought not to be compelled to compete with the public in the purchase of it, but that the committee ought to give them a special right of pre-emption in it. Now, he ventured to submit that such a proposal was never heard of before. Why were the railway company to be allowed to come forward and ask the committee to step out of their regular course and give to them a peculiar right as to pre-emption? Such a course would be thoroughly without precedent. The gas company proposed to sell the land either by public auction or private contract, and the Brighton Company, like all other persons, would have the same opportunity of coming in as purchasers if they chose to do so. With regard to one portion of the land, those who represented Gilbert's trustees laid claim also to a right of pre-emption in it.

Mr. LANG: They waive their right, the same as the Brighton Company do.

Mr. RICHARDS would accept the intimation, and say that it was the first time the promoters had heard of it. If the Brighton Company, he would further observe, claimed a right of pre-emption under their Deed of Conveyance, then it would be a question for a court of law to decide, and not for the committee to interfere with; but, as he understood the matter, the Brighton Company asked the committee to put into the bill a clause to the effect that they, the Brighton Company, should have a prior right in the land over everybody else who might wish to secure it, and this he hoped the committee would certainly not think of granting. This question as to the pre-emption was really the main point of contention in the bill, and he did not apprehend opposition to any of the other clauses that were contained in it. The railway company stated that the preamble of the bill was incapable of proof. Now he should maintain——

Mr. LANG said that the railway company did not object to the preamble after certain alterations had been made in the clauses.

Mr. RICHARDS said that if such was the case he would not trouble the committee with any further observations, but would proceed to call one or two witnesses in support of the bill. He then called

Mr. *George Augustus Jeffery*, who said that he was a doctor of medicine, residing at Eastbourne, and chairman of the gas company. Had been so for many years. [Deed of Settlement produced.] The company was established in 1852 for the purpose of supplying gas within the town and parish of Eastbourne. Their capital at starting was very small indeed. At the present time it amounted to £20,000, divided into 2000 shares of £10 each. Of that number of shares 1150 were actually paid up, and upon the remaining 850, £2 10s. had been paid. The company had no mortgage or other debt. Eastbourne was increasing enormously in population, and he considered it most desirable that provision should be made for more efficiently lighting the town. They desired that their company should be incorporated, and their Deed of Settlement annulled. They proposed to erect additional gas-works in the parish of Willingdon, and also to increase their capital by £30,000, which was a reasonable power to ask for. They also proposed to limit their dividend to 7 per cent. on the paid-up capital on ordinary shares, and 6 per cent. on preference shares, and to borrow £5000 as against the existing £20,000 of the old capital, and £1250 as against each successive £5000 of new capital raised under the Act, making a total of £7500. They conceived that those borrowing powers were reasonable, looking to the probable requirements of the town and district. The site of the new works would be nearly a mile distant from Eastbourne. The inhabitants were greatly in favour of the removal; in point of fact there was no opposition from anybody except the railway company. With reference to the sale of the old site, the directors proposed, after they had erected sufficient works at Willingdon, to dispose of it either by auction or by private contract, and they saw no reason why the railway company should be put on a more favourable footing than anybody else. They would have the same right as other people to come in and bid for it. The object of the gas company was to sell it to the highest bidder.

Cross-examined by Mr. LANG: The spirit of their bill was, that they were going to remove their works to another site, and to dispose of the old one. There was no intention to maintain the existing works.

Mr. RICHARDS said there was nothing in the petition which at all objected to the existing works. He did not understand what his friend was aiming at.

Mr. LANG said that he objected to the preamble as far as those words were concerned. Would Mr. Jeffery object to a clause stating that, as soon as a new site was obtained, the old works should be abandoned?

Mr. RICHARDS objected to the question. His learned friend, in his petition, had raised no objection to the existence of the present works.

Mr. LANG: I do.

Mr. RICHARDS: But you do not state it in your petition. There was nothing to the effect that the existing works were a nuisance to the railway, and ought to be discontinued. Of course the company must have power to maintain the old works till the new ones were in operation.

Mr. BONHAM-CARTER said there was hardly an allegation in the petition to justify such a clause.

The CHAIRMAN presumed that, if such a clause was inserted, all further opposition to the bill would be withdrawn.

Mr. MEREWETHER said that the railway company had instructed him to say that the land would be very valuable to them if the gas company removed, as it would be required for a necessary enlargement of their station. Was it decided by the committee that the company were not to remove?

The CHAIRMAN said that the committee would decide nothing at all.

Mr. LANG (to witness): There has not been a very large increase of building near to the present works. Have any complaints been made——

Mr. RICHARDS thought that his learned friend was travelling out of his way. There was no proof that any nuisance had been caused; and the fact that no complaints had been made against the works by the Local Board of Health, who had withdrawn their petition, was the best proof of that. As to their inability to prove the preamble, of course no petition ever was framed which did not state that the preamble of a bill was not capable of being proved. He asked that they should be kept within the four corners of their petition.

The COMMITTEE said that the opposition must not say that the eighth clause of the petition, as to the preamble, was incapable of proof.

Mr. MEREWETHER said they were not submitting that the works were a nuisance; all they said was, that if the gas company had decided upon removing their works, and would not afterwards want the land on which they stood, they ought to give the railway company the right of pre-emption in the purchase of it, because it was theirs originally. Suppose that the preamble was passed in the state in which it was, the gas company need not remove at all; they would not necessarily surrender their land, and the railway company would have no opportunity of purchasing it. This was the reason why he insisted upon a clause being inserted that they should remove. It being their intention to remove, they ought certainly to express it in their bill; and, therefore, he submitted that the preamble was not right as it stood. A clause ought also to be inserted showing that the railway company should have the right of pre-emption.

Mr. RICHARDS said that the gas company took power for improving their works, for purchasing additional land, and for increasing their capital. That was the form in which their preamble appeared. Then, in clause 44, they said that, when they ceased to use their existing works, they might, from time to time, whenever they thought fit, sell and dispose of the land on which the works were erected, and that such disposition might be made by public auction or private contract. The petitioners wanted to have inserted, not a permissive but a compulsory power, so as to give them the right of pre-emption; and a more unjust thing than this he could not imagine. Then his friend sought to raise a question about nuisance, and such like.

Mr. MEREWETHER would withdraw everything as to nuisance.

Mr. RICHARDS said that, his learned friend having raised a question as to whether they ought not to be compelled to remove, he could not conceive upon what ground he based it, seeing there was no such ground in his petition.

The CHAIRMAN said that Mr. Richards had better proceed with the examination of his witnesses.

Mr. MEREWETHER: Will you tell us what you paid for the land?

Mr. RICHARDS said that this had nothing to do with the question at issue.

Mr. MEREWETHER intimated that if his friend stood out he should be compelled to call witnesses to prove it.

Mr. RICHARDS must ask his friend to confine himself within the four corners of the petition. The gas company ought not to be compelled to state for the information of everybody what price they gave for land which they would wish to sell.

Mr. MEREWETHER only wanted to show the terms upon which they purchased it from the petitioners.

Mr. RICHARDS: You were the vendors, and ought to know.

The COMMITTEE said that the fact could be proved when witnesses were called.

After some further conversation,

Mr. *Alfred Jones*, gas engineer, was called, and said that he was well acquainted with Eastbourne, and he confirmed everything said by the last witness as to the rapid manner in which its population was increasing. The present works were inadequate to supply the town with gas. The site at Willingdon was well adapted for the new works which the company proposed to construct there, and it was an easy distance from the town. The additional capital which the company proposed to raise, as also their borrowing powers, were reasonable.

Mr. MEREWETHER: Why do you want this land?

Witness: Which land do you refer to?

Mr. MEREWETHER: The land on which the present gas-works stand. Supposing we were content that you should have three years, or whatever time you desire, for removal, would you then give us the option of purchasing it?

Witness: The company, I should certainly say, have the right to sell it to the highest bidder.

Mr. MEREWETHER: Is that your position?

Witness: Certainly.

Mr. MEREWETHER: So that we are to understand that the land may be applied for building as well as railway purposes?

Witness: Certainly.

Mr. MEREWETHER: Will it be required for making gas after your new works are completed?

Witness: Certainly not.

The CHAIRMAN: We have had sufficient evidence as far as the preamble is concerned.

Mr. RICHARDS did not wish to prolong the inquiry.

Mr. MEREWETHER then briefly addressed the committee on behalf of the company. He said that Eastbourne had gone on increasing after their station was erected there, and, of course, the increase in the population caused a demand for gas. The land now required was sold to the gas company, and was situated between two portions of the property of the railway company; in fact, it was the neck of the bottle, and was greatly needed by them in order to give greater station accommodation to the public. It would be of no use to the gas company after their new works were completed, and therefore the petitioners contended that they ought to be placed in a position to purchase it; in fact, that they ought to have the option of doing so when the proper time arrived. He did not think that Mr. Jeffery, as the chairman of the gas company, had shown his illuminating power; and he could not help thinking there was a little greed of gain on the part of those for whom his friend was concerned, when they stated that their object was to be allowed to sell the land to the highest bidder. He drew the attention of the committee to the Lands Clauses Act, and said that a pre-emption clause would be found there, which gave an owner who had parted with his property the right of pre-emption if any of it turned out to be surplus land, or something which he wanted to obtain. This would become surplus land to the gas company, and therefore ought to be sold to the railway company, who were the late owners of it, on easy terms, for the purpose of enabling them to give greater accommodation to the public. Supposing that the land had been sold at a comparatively cheap rate, was it right that the gas company should now attempt to make money out of it, when the original owners required it for their own accommodation and, necessarily, for that of the public? He thought, if the committee would give them a right of pre-emption, it could not be said that the railway company were inconsistent in their demands. The site formed the narrowest portion of that inward route which they required for their new station. The Brighton Company never in the slightest degree opposed the making of the gas-works, as they considered them to be essential for the good of the town, and they sold their land under the belief that they were benefiting all parties. The price that the gas company gave was £150, the space being 2800 square yards. Supposing that the right of pre-emption was not given, the railway company might be inconvenienced by some other trade being introduced there, as there were facilities for various manufacturing purposes, and it being land contiguous to the railroad, there were certain to be plenty of bidders for it.

Mr. RICHARDS said that when the company parted with the land there was nothing to prevent them from inserting a right of pre-emption in their Deed of Conveyance. The railway company had had no reason to oppose the gas company. They were very good customers to them in the matter of coal, and it was to their advantage to give them every opportunity of extending their works. The pre-emption clause in the Lands Clauses Act referred to lands which were to be compulsorily taken. It was but natural that the gas company should seek to get the best price for their land, considering that their exposes of removal would be exceedingly heavy.

Mr. MEREWETHER: Thought it was reasonable, they should consider the terms upon which the land was purchased.

Mr. RICHARDS: Do you mean that the land was sold at a lower than market price?

Mr. MEREWETHER: Believed that it was sold at almost a nominal price.

Mr. RICHARDS asked what object the company could have in selling it at such a price.

Mr. MEREWETHER said that the railway company required gas. If the gas company did not supply it, they would have had to erect works themselves. If they took the land compulsorily, they would still have to pay for it by arbitration or otherwise.

Mr. RICHARDS thought that all the questions raised by the bill had been answered. If the railway company really wanted the land, the better way would be for them to become the highest bidders for it; but for them to talk about the right of pre-emption was a thing altogether unheard of. The Lands Clauses Act said that if land was purchased and not afterwards used, then the late owner of it, whose other lands adjoined, was to have the prior right of repurchasing it; and this was a totally different case to that cited by his friend, who sought to set up a claim. His learned friend had twitted the gas company with their greed, but they had a duty to perform to their shareholders by getting the best price they could for it, considering the great expense they would be put to in removing their works. The railway company deliberately parted with their land, and they could not expect to be placed in the position they asked for. He contended that the circumstances of the case did not give them any right to interfere with the bill, and he asked the committee to say that the preamble was proved.

The committee decided that the preamble was proved; and, in answer to Mr. Merewether, the CHAIRMAN said it was their unanimous decision not to grant any right of pre-emption to the petitioners.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS—FRIDAY, APRIL 3.

At the Meeting of the Board this day, at the Offices, Spring Gardens, Charing Cross—Sir JOHN THWAITES in the chair,

The committee of the whole board, on the supply of gas to the metropolis—in pursuance of resolutions of the board of the 20th of December, the 21st of February, and the 28th of February last, referring to them for consideration the bills introduced into Parliament during the present session by the several gas companies, and the bill introduced by Mr. Morrison to amend the Metropolis Gas Act, 1860, and to make further provision for regulating the supply of gas to the metropolis—reported as follows:—

Your committee have given special attention to the provisions of this last-named bill, which contains clauses most important as affecting the interests of the board, the ratepayers, and consumers of gas in the metropolis.

Your committee deem it unnecessary to describe the provisions of the bill, inasmuch as a complete analysis of it has been prepared by the solicitor, and a copy furnished to each member of the board. The bill, if read a second time, will probably be referred to a select committee, before whom your committee are of opinion that the board should be represented; and they recommend that, in the event of the select committee considering that the board should take charge of the bill in committee, the solicitor be instructed to take charge of it on behalf of the board, and carry it through its subsequent stages; and that in any case the solicitor do watch the progress of the bill with a view to protect the interests of the public, and that a petition be prepared and sealed to give the board a *locus standi* before the committee.

Mr. NEWTON moved the adoption of the report, and at the same time said he thought it right to explain that, since the report had been agreed to by the committee, a different phase of events had occurred. The bill was read a second time the previous night, and there had been some arrangement between the promoters and the gas companies, though it was not clearly stated what it was. It had reference, however, to the clauses as to the purchasing powers of the board and the City, and as to the purchase of gas in the bulk. The committee were prepared to submit the resolution he had moved when they knew what the bill was; but he did not know how the board would be disposed to act, as they did not now know what the bill was at the present moment. It was one thing to instruct their solicitor when they knew what the bill was, and altogether another thing when they did not know this. He would, therefore, move that a petition be presented, as recommended, and that it be referred to the committee to instruct the solicitor, and to take such proceedings as they might deem necessary, reporting to the board from time to time. The object of the committee was to see that the public were protected. The Act of 1860 had failed, and that was an Act which was obtained by irresponsible persons, the cost thereof falling on this board, and therefore on the ratepayers, to the amount of £5000. The board were anxious, therefore, to protect themselves against such a proceeding on any other occasion. This bill was being promoted in a similar way, and was taking the same course, and the committee felt that it should rather be promoted by some body that represented the ratepayers. Its last clause proposed to throw upon this board the costs of passing the present measure, and also of the failure of last year. If the costs in 1860 were £2000, it was impossible to calculate what the expenses of last year and this year would be. The outlay of the board last year was £2000; the corporation spent more than £5000; and the expenses of the companies were £17,000 or £18,000. It would, therefore, be impossible to say what expenditure had been incurred by the promoters of the bill, who acted under the direction of the Government. It was necessary that legislation should take place, but it should be under the guidance of the board, the corporation, or some body representing the people who would have to pay the expenses. It should not be left to those whose object would be to get a clause inserted to indemnify them for their outlay. If the committee of the House of Commons passed the preamble of this bill legislation was pretty sure to take place, and it should be the object of the board, in the interest of the ratepayers, to make this as complete and strict as possible. The gas companies were quite able to take care of themselves. The committee had every desire to do justice to the gas companies, and had no wish to place them in a position that would be injurious to them. They only asked that proper and fair restrictions should be imposed in return for the monopoly they enjoyed.

Mr. COLLINSON seconded the motion.

Mr. BIDGOOD felt it right to say, as to the course taken by those who were promoting this bill, that nothing was done by them until after the declaration of the board that it would not do anything this year. The board had resolved that it was not expedient to take any action this year.

Mr. COLLINSON: It resolved not to introduce a bill.

Mr. BIDGOOD believed that the passing of this resolution was to a great extent due to the feeling that this board was trying to grasp everything. He did not thing it desired to grasp the gas question. The question now arose as to whether it would benefit the public to take such action as would lead to legislation. Easter was nearly here, and no proposition had yet been made by the board; and though this gas question involved such tremendous liabilities (for in gas matters millions were talked about quite familiarly), yet the board, at the eleventh hour, was about to see whether it could mould something out of Mr. Morrison's bill that would be to the public interest. The committee should make some arrangement so that the thing could be gone into thoroughly next year, and this would be the most advisable thing to do as to the public. He believed the gas companies would not be found impracticable bodies to deal with. It would be better for them to have fixed moderate incomes than to have these questions agitated every year. There should be an understanding that if this matter was forced on the board it would take it up.

Mr. PHILLIPS pointed ont that the alterations in the bill might be of such a nature as to render it imprudent for the board to accept the bill. The board should secure a *locus standi*, but it should not give power to any committee to act in reference to a bill of such importance.

Mr. RICHARDSON reminded the board that, unless it took action, legislation might go ahead of it in a very unsatisfactory way. Even if this should not be so, there might be another bill next year seeking powers to recoup the promoters of this bill out of the board's funds. This might thus go on from year to year. The cause of all this was the supineness of the board, which should have brought in a bill itself, just as the City authorities had. Why should not the board seek for the same powers the City was asking for? The City might now get them, and the board not. The bill without the compulsory clauses would be nothing. He hoped the whole thing would be thrown back, so that, instead of being dependent on other people, the board might bring in a bill of its own.

Mr. SHAW observed that this was an important question, as the bill cast the whole expense of promoting it and the bill of last session on the board; and this though the board objected to having the power, as proposed, to purchase the various gas-works. There were discussions in the House of Commons as to the expenditure of the board, and this being so, it was unjust for bills to be promoted, and then the expenses attached to passing them to be cast on the board. Last year the professional expenditure of the board was £29,000, but if this course was to be adopted no one could tell what it would reach this year.

Mr. FREEMAN could hardly understand what Mr. Bidgood meant by the board making an arrangement with a committee of the House. Was the board omnipotent, so as to be able to accomplish this? If they had not the power to do this, and clearly they had not, were they prepared to rest content while the ratepayers were saddled with such enormous expenses? He could not consent to hand over the power in this matter to the committee, and the reference should be only to consider and report.

Mr. NEWTON had no objection to alter his motion, as proposed by Mr. Freeman. He never meant the committee to do anything beyond instructing the solicitor as to taking charge of the bill. He would never consent to any committee having power to pledge the rates of the metropolis. The solicitor should be authorized to regulate and agree to clauses, but not in the present stage to take charge of the bill. The proposition that if one company's works were taken the works of all the companies must also be taken, made one timid as to taking charge of the bill.

The board then ordered a petition to be prepared, as recommended, and referred the bill back to the committee to consider and report from time to time.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary Meeting of Proprietors was held at the London Tavern, on Monday, April 6—T. B. SIMPSON, Esq., in the chair.

The SECRETARY (Mr. Livesey) read the notice of the present meeting, and the minutes of the last meeting. The corporate seal of the company was affixed to the register of proprietors, and the following report was then submitted:—

The directors have much pleasure in reporting that the business of the company continues to increase regularly and very satisfactorily, the rental for the year to the 31st of December last being nearly £8000 in excess of the year preceding.

The last call on the new shares, which has all been paid except the trifling sum of £18, completes the capital which the company is authorized to raise; and as the rapid extension of the business necessarily demands a continuous outlay, the balance in hand will very soon be exhausted, and, therefore, the directors will be compelled, very shortly, to make application to Parliament for power to raise an additional amount, unless the comtemplated legislation of this year should make it unnecessary.

The new gasholder, which the proprietors were informed at their last meeting was in course of erection, has since been completed. No further outlay of any importance will be required in the works this year, but it will be necessary to make some alterations in the mains in the district, and also to extend them to several new streets not hitherto lighted.

The rental for gas and the receipts for products, &c., for the half year to the 31st of December last amount to £51,933 12s., and the expenditure for the same period to £40,363 12s. 1d.; leaving a balance of £11,569 19s. 11d. for the usual dividend to that date.

Since the commencement of the present sessions of Parliament, a bill, promoted by several of the London companies, to amend the Metropolis Gas Act of 1860, and to carry out the resolution of the select committee of last year, has been read a first time, and another bill of similar character has been introduced into the House by Mr. Morrison. Both of these bills the directors have considered it advisable to petition against, as they think it necessary to have the power to appear against any scheme which does not secure the advantages the proprietors at present possess, and to which the sound and prosperous condition of the undertaking fairly entitles them.

In accordance with the Act of Incorporation, one director and one auditor retire from office at this period. Beriat Drew, Esq., as director, and Mr. Frederic Simpson as auditor, will therefore retire accordingly, but these gentlemen, being eligible, have given notice of their intention to offer themselves for re-election.

The CHAIRMAN: Gentlemen, in asking you to receive this report and enter it upon the minutes, I have very few words to say, except to congratulate you upon the satisfactory condition in which your property is at present placed. I believe conscientiously that ours is about as sound an undertaking as shareholders can well be engaged in; and, but for the attacks with which we, in common with other companies, are occasionally threatened, everything would be as prosperous as we could reasonably desire. It is always a pleasure to meet you here, and to congratulate you upon the progress of our enterprise. Of course we have our difficulties to contend with, but they are usually such as to cause us little anxiety or trouble. On the last occasion, I announced to you that the bill introduced into Parliament with reference to the supply of gas to London, in the session of 1867, had been abandoned, the companies feeling that they could not consent to it, in consequence of the attempt of the promoters to interfere with their dividends. You will recollect it was proposed that, if the companies could not make up their maximum dividend for any year out of the profits of the year, they were not to be allowed to do so out of the profits of any succeeding year. Under those circumstances, the thing was abandoned; but now there are three bills, if not four, before the House of Commons, which affect the companies. One has been introduced by some of the directors themselves, but many of the clauses of that bill are so objectionable, that we thought it was right to oppose them. We immediately retired from the chairmen's committee, in order that we might be at liberty to take that course, and we feel that in doing so we are fully justified. When the bill of last session was before the House, we were prepared to give way on many points, in order, if possible, to get a settlement of the main question. As I said, the bill which the companies themselves have introduced this year is very objectionable in some respects, and what is so surprising is that many of those companies at the present time cannot pay 10 per cent. Indeed, one large company can only pay 5½ per cent. What prospect would there be, therefore, that they would be able to reach their maximum dividend after they came under obligation to supply gas of a higher illuminating power than at present? For, as you no doubt are aware, the higher the standard of illuminating power the smaller is the consumption of gas, and consequently the rental would be very much diminished. But I need not go further into these matters; and, indeed, I should be very sorry to say anything which could at all offend our fellow-directors in other companies. We have a very high respect for them, and we believe they know their own business better than we do. We can only look on at present; perhaps hereafter we may be told that we were wrong in our opinion. With respect to the bill introduced by Mr. Morrison, we have determined to oppose it, for, although some of the objectionable clauses have been withdrawn, there are others which, in their present form, we think would work very injuriously to us, and therefore we must exert ourselves to get them amended. I believe we have a good case, and that we shall succeed. With these remarks I move—"That the report now submitted be received, and entered on the minutes."

The motion, having been seconded, was put, and agreed to unanimously.

The SECRETARY read the following statements of accounts:—

Dr. *Working the Establishment, for the Half Year ended December 31, 1867.* *Cr.*

To Gas-rental—				By Directors and auditors			
September 29	£14,198	7	3	Salaries and commissions			
December 31	25,185	1	7	Rent and taxes			
	£39,383	8	10	Stationery and general charges			
Residual products	11,347	18	1	Supervision and labour			
Old materials	60	7	4	Tools and implements			
Miscellaneous receipts	1,141	17	9	Repair and maintenance			
				Purifying and labour			
				Coals carbonized			
				Main-pipes			
				Service-pipes			
				Meters			
				Distribution			
				Bad debts and allowances			
				Balance			
	£51,933	12	0		£51,933	12	0

Dr. *Balance-Sheet, December 31, 1867.* *Cr.*

To Reserve-fund	£20,000	0	0	By Works and freehold			£229,831 14 3
Revenue account	15,682	14	10	Amount due to the company—			
Payment-in advance	601	14	10	Gas	£25,501	12	5
Investment-fund	7,576	7	10	Products	1,466	15	11
Capital	249,267	0	0	Sundries	148	7	5
Unclaimed dividend	401	4	4	Interest	431	13	9
Sundry creditors	3,115	13	1		27,548	9	6
				Stock—			
				Coals	£6,839	11	9
				Mains	1,080	6	2
				Services	258	15	0
				Meters	1,745	3	3
				Products	592	12	6
					10,516	8	8
				Cash—			
				At bankers	£442	12	10
				In hand for freight, &c.	300	0	0
					742	12	10
				Investment—			
				Consols	£20,000	0	0
				Ditto	7,458	15	11
					27,458	15	11
				Due from estate of the late Sir C. R. Price			546 13 9
	£296,644	14	11		£296,644	14	11

On the motion of the CHAIRMAN, the accounts were received.

Mr. GRAY said the accounts which had been read must have conveyed to every one who had heard them an idea of the very satisfactory position of the company. There could be little doubt that, while the administration of affairs was in the hands of such an able body of directors, the company would continue to prosper, always assuming that they were left in peace and quiet to carry on their operations. Unfortunately they, in common with the directors of other metropolitan gas companies, had for some years been exposed to the effects of the agitation raised for the purpose of obtaining a reduction in the price of gas; but he hoped a period would soon be put to that agitation, which was, in fact, the only way in which the object desired could be obtained, for, while the companies were subjected to heavy expenses annually in defending their interests, the prospect of a reduction in the price of gas must be indefinitely postponed. The bill introduced into Parliament this session for regulating the supply of gas to the metropolis was very objectionable in some of its clauses; but the directors had several interviews with the promoters, and he felt great pleasure in stating that they had been able to get those objectionable clauses expunged. The bill had been recommitted, and he believed that this session would terminate the agitation to which for some years the companies had been subjected. It might probably be supposed, after the remarks which he had made in reference to Mr. Cardwell on some former occasions, that he entertained an objection to the reappointment of the right honourable gentleman as chairman of the select committee on this question. But, having had several opportunities of seeing Mr. Cardwell, he had come to the conclusion that, however at one time he might have had mistaken views on the subject, there was no desire on his part to inflict any injury upon the companies. He felt sure that their interests would be perfectly safe in the hands of the right honourable gentleman and the other members of Parliament with whom he was associated, and that the inquiry about to be instituted would not be prolonged to such an extent and at such enormous cost as the inquiry of last session. There was only one other matter upon which he wished to express an opinion. Probably some of the proprietors had read in the columns of the JOURNAL OF GAS LIGHTING a report of the evidence given by Mr. Innes, the engineer of the Phœnix Gas Company, on the recent arbitration in reference to the sale of the Weymouth Gas-Works. He would say no more about the matter than that he never read evidence in his life which more surprised him. It certainly suggested this idea to his mind, that, if gas engineers were not sufficiently compensated for their services by the companies for whom they were engaged, their salaries ought to be raised; but under no possible circumstances should they be permitted to go before an arbitrator and express opinions in evidence upon the affairs of their company. In this way serious mistakes had before been committed, and he trusted there would be no repetition of such proceedings.

The CHAIRMAN then moved—"That a dividend at the rate of 10 per cent. per annum on the paid-up capital of the company be now declared, and that cheques for the same be forwarded to the proprietors on the 9th inst."

The motion was unanimously adopted.

The retiring director, Mr. Drew, and the retiring auditor, Mr. Simpson, were severally re-elected, and returned thanks on their appointment.

On the motion of Mr. GRAY, a vote of thanks was passed to the chairman and directors for the efficient manner in which they had conducted the affairs of the company.

The motion having been cordially adopted,

The CHAIRMAN acknowledged the same, and took occasion to say that he differed a little from Mr. Gray in regard to the Metropolis Gas Bill

introduced by Mr. Morrison. He believed there were still some objectionable clauses in the bill.

Mr. GRAY admitted they were, and hoped they would be amended or expunged in committee.

The CHAIRMAN said if they were removed, and the bill brought into an acceptable shape, he thought the companies might congratulate themselves at the prospect of a termination of all strife on the gas question, and the consequent depreciation which had taken place in gas property.

On the motion of Captain HENNING, it was resolved that the thanks of the proprietors be given to Mr. T. Livesey, the secretary of the company, for the very able manner in which he had discharged the duties of his office.

Mr. LIVESEY, in acknowledging the vote, said he was sincerely thankful for this expression of the approval of the meeting, and for the very kind manner in which Captain Henning had spoken of his services. He had served the company for many years, but he thought the time was near at hand when his assistance would be no longer required. He anticipated as the effect of this year's legislation, that an amalgamation was almost certain, and although such a proceeding might not do this company much or any good, it could not, in his opinion, if left to three independent men, result in any sacrifice of their property.

On the motion of Mr. GRAY, a vote of thanks was given to the auditors, which was briefly acknowledged by Mr. Simpson, and the proceedings terminated.

ANTI-INCRUSTATION SOLUTION FOR BOILERS.—To prevent the formation of strongly adhesive sediments in a steam-boiler, mix 125 kilogrammes of crystallized chloride of barium, dissolved in 50 of water, with 25 kilogrammes of hydrochloric acid having a specific gravity of 1·20; apply 15 parts by measure of this acid solution to every 1000 parts of water to be used in the boiler.

COMMERCIAL GAS COMPANY.

The Ordinary General Meeting of the Company was held at the London Tavern, Bishopsgate Street, on Friday, April 3rd.

Mr. BRADSHAW commenced the proceedings by stating that he had been desired by Mr. Charles Salisbury Butler, M.P., the chairman of the company, to express regret that he was unable to preside on this occasion. Returning from his duties at the House of Commons on the previous night, Mr. Butler met with a slight accident from the collision of his brougham with a street cab. Fortunately Mr. Butler was not much hurt, but looking to the importance of his attendance in Parliament that evening, he felt it was better, after the shock he received, to keep himself as quiet as possible during the day. In the absence of their esteemed chairman he (Mr. Bradshaw) proposed that Mr. Brushfield be requested to preside over the meeting.

The motion was seconded, and carried unanimously.

Mr. BRUSHFIELD having taken the chair,

The SECRETARY (Mr. Jaques) read the advertisement convening the meeting, also the minutes of the last ordinary meeting.

The seal of the company was then affixed to the register of proprietors, and the following report and statements of account were presented:—

The directors report that a bill has been introduced into the House of Commons to amend the Metropolis Gas Act, 1860. The directors have the provisions of this bill under their anxious consideration.

During the half year ending the 31st of December last, a net profit has been realized amounting to £23,576 16s. 8d., and the directors recommend that a dividend of £5 per cent. for the half year (less income-tax) be declared.

The following directors—viz., James Holbert Wilson, Thomas Brushfield, and Alexander Thomas Laport, Esqs.—go out of office by rotation, and, being eligible, have given notice that they will offer themselves for re-election.

Edward Marsh, Esq., auditor, retires by rotation, and, being eligible, has given notice that he intends to offer himself for re-election.

STATEMENT OF ACCOUNTS,

Showing the Actual State and Condition of the Concerns of the Commercial Gas Company, for the Six Months, ending the 31st day of December, 1867.

I. CAPITAL.—*State of the Account at the End of the above Six Months.*

Statute, or Authority, under which raised.	Number of Shares.	Amount per Share.	Paid up per Share.	Total Paid up.	Total Capital.
Shares	17,486-2/5ths-1/10th-1/20th 3-4/5ths-1/10th	£25 0 0	£25 0 0 Various.	£437,163 15 0 66 10 0	
COMMERCIAL GAS ACT, 15 & 16 VICTORIA, cap. 155.	17,490-2/5ths 1/20th				£437,230 5 0

II. REVENUE.—*Account during the above Six Months.*

RECEIPT.			EXPENDITURE.		
Sale of gas—			Management—		
At 4s. per 1000 feet	£59,430 6 6		Directors allowances	£ 750 0 0	
Public lighting and contracts	7,399 15 8		Salaries of secretary and clerks	1,392 4 2	
		66,330 2 2	Collectors commission and pay	516 3 8	
Sale of residual products—			Rent, rates, and taxes of offices	50 0 0	
Coke	£13,650 7 5		Stationery, printing, and general charges	1,119 18 8	
Breeze	229 17 3		Payment to auditors	75 0 0	
Tar	1,433 9 2				£3,903 6 6
Ammoniacal liquid	882 8 5		Manufacture of gas—		
		16,196 2 3	Coals, including carriage, dues, &c.	£37,841 6 7	
Miscellaneous receipts		331 12 8	Purifying materials	950 6 4	
			Supervision and labour	9,881 2 10	
			Tools and other implements	304 5 0	
			Ordinary repair and maintenance of premises	2,353 9 5	
			Rents, rates, and taxes of manufactory	1,554 14 7	
					52,885 4 9
			Distribution, including service-mains, pipes, &c.—		
			Ordinary repair and maintenance		1,574 0 8
			Meters—		
			Restoring and replacing		755 7 8
			Law and parliamentary charges		653 2 0
			Interest paid from profits on £500, borrowed capital, at 4 per cent.		9 18 10
			Balance for shareholders profit		23,576 16 8
	£83,357 17 1				£83,357 17 1

Reserve-fund invested in Consols, £9569 5s. 11d.

We have examined the above accounts, and certify them to be correct.

CHARLES SALISBURY BUTLER, *Chairman.*
GEORGE JAQUES, *Secretary.*

The CHAIRMAN: Gentlemen, it is now my duty to move—"That the report and accounts be received, adopted, and entered on the minutes." In doing so I cannot but remind myself that I have a most difficult task to perform, because you have been accustomed to hear from the lips of our worthy chairman such an exposition of the state of the affairs of the company and of the gas world generally as you could put implicit confidence in. The position of the metropolitan gas companies has been such of late years that it is a matter of wonderment they continue in existence at all, and it is almost a matter of surprise that people have dared to continue shareholders in them. It would appear, from the way in which Parliament is asked to deal with the companies, as though, in the estimation of the public, shareholders, directors, and officers, and every one connected with the companies, were the greatest knaves in existence. I believe there are no other joint-stock enterprises in the world which are interfered with in the way gas companies have been interfered with, and I think it is a very strange and anomalous state of things indeed that, after the risks to which the companies were exposed in the early history of their undertaking, they should not now be permitted to reap the fair return of their labour and anxiety, and of the capital they have invested in the service of the public. Why, the time was—and I recollect it well—that when it was proposed by Mr. Winsor to light the public streets with gas, people were seized with alarm, and dreaded that some great convulsion would be the result, and I have heard the remark that it was not safe to walk along the streets for fear of being blown up by the hot air which it was supposed passed along the pipes. But since then, owing to the care, and skill, and attention which gas companies have brought to bear upon the manufacture, so as to render the use of gas convenient, and economical, and healthy, it has become almost a necessary of life to us. But look at the hundreds and thousands of pounds which have been raised and expended as capital for the purpose of bringing the manufacture to its present state, and to meet the constantly growing requirements of the public; and yet, if some of the bills which are brought before Parliament were to be adopted, the whole of this vast capital would be ignored and cast aside. We are told that the capitals of the several companies are in excess of what they should be, and that if new works were to be now established by means of bonds at 6 per cent., gas could be supplied much cheaper than we supply it. But, gentlemen, I have that confidence in the good sense and honour of our legislators that I cannot for a moment believe the House of Commons will be a party to such a nefarious act towards the gas companies. I feel confident that those companies have done their duty honestly and fairly towards the public. I know it as a matter of fact as far as our own company are concerned. They have carried on their affairs with an earnest and enlightened desire not only to secure for you the dividends to which you are entitled, but also to give the fullest satisfaction to the consumers in their district. And what has been the result of all our anxiety and labour? The use of gas is not a thing confined to the aristocracy, but the poorest artisan in the metropolis can have it in his room with advantage and economy; and now that its value and necessity are acknowledged, it is said, "Oh, but the companies are making 10 per cent. dividends." That is the real grievance; and the Board of Works, to which I have the honour to belong, say, "You are getting 10 per cent., and that is more than you ought to have." When some time ago the question of the supply of gas was before them for consideration, and I pressed my opinion, not for the purpose of serving you, but in the cause of justice and fair play, that before they undertook to interfere with the companies they should make themselves acquainted with the subject, and obtain the advice of some first-rate engineer or chemist, so as to be able to give an answer that would stand investigation when Sir Stafford Northcote asked them at what price they would be prepared to supply gas, on that occasion I could not get a seconder. Sir John Thwaites proposed that the interests of the companies should be purchased with 6 per cent. bonds, which he said would be much better for the shareholders than their present 10 per cent. dividends, because, he stated, they might wake some fine morning and learn that a new light had been discovered which should entirely supersede the use of gas. Why, this was the very best argument that could be used to justify us in asserting that, considering the extremely precarious nature of the business, 10 per cent. was not too high a rate of dividend for the shareholders to receive. Gentlemen, I believe we have acted honestly all through our career, and I tell you that I would not be here as one of your directors, nor would I sit at the Metropolitan Board as a member, for the purpose of serving myself. I desire to do my duty as an honest man, and I believe that honesty and the love of justice are so indigenous in the minds of Englishmen that, notwithstanding all the assaults which have been made upon the gas companies, we shall come out of the struggle without any serious damage,

and that the justice of our cause will eventually be recognized by the public at large. But while the agitation is continued, as it has been now for some time, our property is depreciated, our attention is taken off from legitimate business, and we are put to heavy expenses. And where does all the money come from for the purpose of maintaining the agitation and promoting bills, which, for the protection of your interests, we are bound to oppose? Out of the pockets of the consumers. See how it works. By the Metropolis Gas Act of 1860 the Legislature said that we should be entitled to 10 per cent. dividends, and that, when the profits of our undertaking were more than the payment of that rate of dividend required, we should apply the excess in reducing the price of gas to the public. What prevents a reduction of price? Why the necessity which has been created for the expenditure of hundreds and thousands of pounds in defending those rights which, sanctioned by Parliament, ought never to have involved the expenditure of one shilling. And what would be the consequence, supposing these agitators succeeded in their endeavours? The *Times*, on one occasion, very pointedly remarked that there was no cheaper way to get gas than to steal it. That is a proposition which every one can understand. But, gentlemen, if that state of things is to come to pass, and if the interests of gas, and railway, and other companies, are to be sacrificed in the way which has been proposed, what security will there be for the future investment of capital. I dare say some of you have been, as I myself have been, instrumental in inducing persons to take shares in this or other companies, in the faith and confidence that the enactments of the Legislature respecting them would be held sacred. I know of cases in which the sole provision for orphan children is the investment so made, and I know instances in which widow women are wholly dependent upon the dividends in their old age. Is it, then, a trifling matter that we are concerned for? Are we in England to have a law passed in 1860, which is supposed to be a settlement of the question, and every year afterwards to have attempts made to abrogate it, not because the provisions of that law have been disregarded, but merely because of the clamour raised by certain persons? So far as that Act is concerned, I believe that the obligations it imposes upon the companies have been most faithfully observed. We are told sometimes that there is a great deal of dissatisfaction with the proceedings of the companies. We do not find it so; and I believe, if you were to canvass London from one end to the other, you would not find that there is anything like the dissatisfaction which it is sometimes attempted to make out. Of course it is very easy to get up a cry for cheap gas; and I know of a case in which one of these jobbers went to a place the other day, and asked, "Wouldn't you like gas at 2s. 6d. per 1000?" But if, to gratify the unreasonable demands of such persons, the solemn provisions of an Act of Parliament are to be set aside, there is something even more serious at stake than your interests. If persons who hold property on the faith of Acts of Parliament find that those Acts are recklessly to be repealed, and their interests ignored, what will be the consequence? People will say, "We have no confidence in legislation; there is no security for property in England;" and capital will find its way abroad. It is a grave question, and one which cannot be trifled with. I have said before, and I say it again, this is a consumers question, and I feel convinced that if the consumers of gas in the metropolis knew as much as I do, or as much as any one else connected with the manufacture of gas, they would meet together and take the matter out of the hands of those who have raised this agitation, and who seek to put money into their own pockets, having no power and no desire to serve the public in what they do. I believe that the conduct of the companies is such that they can with confidence submit themselves to the examination of any tribunal in the world, and, as I remarked before, I have faith in the good sense, the honour, and integrity of the English public, and that, in the end, these people who are trying to depreciate and to destroy our property will not succeed. Entertaining this conviction, although I have spoken thus, I feel that there is nothing to discourage us. I believe our case is a good one, and I commend it without fear or shame to the understandings and judgments of the consumers at large. So far as our own company is concerned, our affairs are in a perfectly satisfactory state, and I trust they may long continue so. I regret exceedingly that our esteemed chairman is not here to-day. He has been most indefatigable in his endeavours to serve you, and I believe he has been perfectly loyal to your interests. I think you will find our accounts and everything connected with the works exhibit signs of prosperity, and therefore, apologizing for having trespassed so long upon your time, I have great pleasure in moving the adoption of the report.

Mr. RHODES seconded the motion.

A PROPRIETOR remarked that the sum of £500, which formerly appeared in the capital account under the head of "Borrowed moneys," had disappeared.

The CHAIRMAN said the money had been repaid. It was the last link in the chain, which had now been struck off.

The motion was then put, and carried unanimously.

The CHAIRMAN moved—"That, pursuant to the recommendation of the board of directors, a dividend of 5 per cent. for the half year ending the 31st of December last, less income-tax, be now declared, and that cheques for the same be forwarded to the shareholders on Monday, the 6th inst."

Mr. RHODES seconded the motion, which was put and carried.

The retiring directors, Messrs. Wilson, Brushfield, and Laport, and the retiring auditor, Mr. Marsh, were severally re-elected.

Mr. OWDEN moved a vote of thanks to Mr. Brushfield for his services in the chair on this occasion, and to the directors generally for their continued attention to the business of the company.

The motion having been seconded, was cordially adopted.

The CHAIRMAN acknowledged the vote.

Mr. GRAY: Gentlemen, before you separate will you permit me to submit a resolution for your consideration? I might have been induced, if our worthy chairman had not gone so fully into the question, to make some observations upon the position of the metropolitan gas companies. But he has left me nothing to say, and I shall content myself by at once proposing my resolution, which is an expression of our regret that through an accident we are deprived of the valuable services of Mr. Butler to-day. There is no man living for whom I entertain a more strong personal regard than I do for the chairman of this company. He has been thoroughly consistent throughout his career, and he has left no means untried to promote the interests of this company. I sincerely hope that, so far as the gas companies generally are concerned, the time of agitation will soon be past, and that gentlemen who have embarked their money in undertakings of this kind will receive the same protection that landed proprietors receive for their investments. The bill which has been brought into Parliament this session to regulate the supply of gas in the metropolis was extremely objectionable in many of its clauses, and we had intended to obtain its rejection; but certain concessions have been made by the promoters which have induced us to consent to its second reading. My own impression is, that if this bill is passed with the amendments we desire, our property will be placed in a much better position than it has been for many years past. Having made these remarks, I shall ask you to join with me in expressing regret at the accident which has deprived us of the presence of Mr. Butler on this occasion.

The CHAIRMAN: I beg leave to second the motion, which perhaps ought to have come from me. I believe that no man ever discharged his duty more conscientiously and faithfully than he has done; and, as I said before, no man has been more loyal than Mr. Butler to the interests of the company on all occasions. Every one who knows him will accord him this meed of praise, and we, his fellow-directors, who are more closely connected with him, feel that he richly deserves the thanks and the confidence of the proprietors.

The motion was then put, and adopted with much cordiality.

Mr. BRADSHAW said he should have very much pleasure in conveying the sentiment of the meeting to Mr. Butler, who, he was happy to state, was not at all injured by the accident.

On the motion of Mr. RHODES, the thanks of the proprietors were given to Mr. Jones, the engineer, and Mr. Jaques, the secretary of the company, for the faithful and energetic discharge of their duties.

Mr. JONES briefly acknowledged the vote, and the proceedings terminated.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Tuesday, March 31, in the Offices, Grafton Street—THOMAS M. GRESHAM, Esq., in the chair.

The SECRETARY (Mr. Stevenson) read the advertisement calling the meeting, and the seal of the company was affixed to the register of shareholders.

The SECRETARY read the following report:—

In submitting their report and accounts for the half year ending the 31st of December, 1867, the directors cannot of course help regretting that there should exist any circumstances requiring them to recommend that there shall not be paid for that period so high a rate of dividend as that which for a series of years past the proprietary have been in the habit of receiving; but, notwithstanding the present necessity for that reduction, the directors are nevertheless of opinion that, considering the many and serious disadvantages under which the operations of the company have been conducted at one of the stations, and to which allusion is made elsewhere, the accounts now before the proprietors may, on the whole, be regarded as satisfactory.

There can hardly be a shareholder who is not aware that the amalgamation and purchase effected by the recent Act of Parliament had the effect of working a vast change in the company, as it existed prior to that time. In addition to the public lighting of the whole city, this company became bound to supply the private lighting of all the city and its large and growing suburbs with a gas of nearly 35 per cent. higher illuminating power than that which had been previously dispensed. In fact, the obligations and operations of three several and separate companies, with the no immaterial weight of giving 16-candle gas, became the consolidated duties of this company. To discharge these duties, and in due time to reap the advantages of that consolidation, it became essential to devise, and place in course of realization, changes and measures of a material nature, just as comprehensive in their character as those that had been directed by the Act of Parliament.

It became unavoidable to proceed to erect new and additional works at the Brunswick Street concerns, and, besides enlarging and remodelling existing works, to revise and to a great extent relay the gas-mains and pipeage throughout the leading localities of the city.

It is but just to state that, having had explained to them the nature and causes of the difficulties that temporarily existed in the way of the working operations of the company, the corporation committee who have charge of the public lighting have, on the few occasions of failure as to illuminating power, been in expression and action most indulgent and considerate; but the board nevertheless felt themselves constrained in honour and law to fulfil to the best of their ability, and if possible to the very letter, and at any amount of cost, the obligations they owed to the citizens and their representatives in the Town Council.

To this, among other exceptional causes, may be attributed what can only be looked upon as a temporary check to the prosperity which has for many years so pre-eminently distinguished the operations of the company. The coal required to produce the gas, or, in other words, to bring up the standard of illuminating power to that prescribed by the Act of Parliament, added very considerably to the cost of production, and, as a matter of course, materially affected the profits of the half year. In addition to this adverse circumstance, the board have to regret a considerable decline in the sale of coke—the consequence of the mildness of the season—while they have also to notice a large increase in the wages of the manufacturing department. In addition to these heavy items, the present account has to provide for the interest payable to the bondholders, and the dividend to the proprietors of the late Hibernian Company, who were only entitled at the making up of the last profit and loss account to three months dividend, from the 31st of March to the 30th of June. All these serious drawbacks would, however, have been met and overcome, but for the delay in the completion of the necessary alterations and improvements still in progress at the Great Brunswick Street station.

While referring to unpleasant circumstances, it is gratifying to the board to be enabled to state that the business of the company continues steadily to advance, and more especially in the suburban districts, where the increase of rental over the preceding six months amounts to upwards of £1600. It is also matter of gratification to the directors that, after a careful review and consideration of all the circumstances adverted to in this report, they feel justified in expressing a confident reliance that when the extensive works now in progress shall have been completed, and the company in the enjoyment of all the advantages to be derived from the consequent diminution of working expenses, and the reduction in the cost of materials for the production of gas, they will, at no remote period, be enabled to assure the shareholders that the affairs of the company have been securely placed upon a basis of permanent and enduring commercial prosperity. To this all their efforts will be directed, and they trust and hope that the operations of the Great Brunswick Street station will, in the coming season, present the same gratifying and profitable results which have characterized the operations of the station on Sir John Rogerson's Quay.

Having thus briefly and frankly explained the causes which have operated to the disadvantage of the company, the board may be permitted to direct attention to the efforts they have made to complete the reorganization of the street-mains, and render the combined works of the company a continued source of profit to the shareholders. The nature and extent of these works may be estimated and ascertained by the fact that the outlay thereon—including the sum paid the contractor on account of buildings—amounts to upwards of £40,000.

While referring to the Great Brunswick Street station, it may be gratifying to the proprietors to know that a section of the new retort-house has been worked during the last three months under Best and Holden's patent for charging and drawing retorts by machinery, and although labouring under the disadvantage and disappointments to which all new inventions are subject in the early stages of their development, the board are happy to say the machines have been most effective and successful in their action, and when certain alterations have been made in the position of the hydraulic main and ascension-pipes, as recommended by T. G. Barlow, Esq., the company's consulting engineer, the board have no doubt that the introduction of the new system of working will be attended with most important results.

The board regret having to inform the proprietors that a considerable quantity of coal, in store at Great Brunswick Street, has been damaged by fire. The loss, however, is nearly covered by a policy of the Atlas Insurance Company, and is at present under the consideration of the two boards.

Having thus briefly detailed the proceedings of the board during the half year, they have now to direct the attention of the shareholders to the accounts, and more especially to the statement of profit and loss, showing a net gain—after providing for payment of interest on the bonds—of £13,110 4s. 11d., from which they recommend, free of income-tax, a *pro ratâ* dividend on the several classes of shares at the rate of 6 per cent. per annum.

The tenure of office of four members of the board—namely, Thomas M. Gresham, Denis Moylan, D.L., Sir John Gray, and E. H. Kinahan—expires this day; all of these gentlemen have offered themselves for re-election, and are eligible accordingly.

John Hyland, Esq., one of your auditors, retires from office this day by rotation, and having expressed his readiness to serve again, is eligible for re-election.

Balance-Sheet, Half Year ending December 31, 1867.

Dr.				*Cr.*			
To Purchase of gas-works, street-mains, services, meters, &c., and cost of new mains, services, extensions, house and office furniture, &c.		£462,839	19 7	By Proprietors stock, class A	£152,000	0 0	
Expended this half year		32,835	12 9	Ditto, class B	50,000	0 0	
Cash paid to Mr. Meade on account of his contract		8,825	0 0	Ditto, class C, No. 1	135,000	0 0	
Lamp-posts and lamps		5,516	11 7	Ditto, class C, No. 2	60,000	0 0	
Stores		4,173	7 5	Company's bonds, at 4½ per cent.	38,100	0 0	
Coal—stock on hand		13,065	9 4	Company's bonds, at 5 per cent.	80,000	0 0	
Coke, breeze, and tar		2,648	1 6				£515,100 0 0
Cash on hand and bills receivable		622	5 0	Contingent-fund	£6,673	8 6	
Due for gas and meter rent		49,056	15 7	Undivided profits	£14,934 12 3		
Ditto coke, breeze, and tar		3,680	1 10	Gain on this half year	13,110 4 11		
Ditto fittings	£2,070 17 0				28,044	17 2	
Ditto rent of fittings	171 0 2			Insurance-fund	1,362	1 9	
		2,241	17 2				36,080 7 5
Due by sundry persons		664	13 2	Bills payable	£20,783	3 8	
The Atlas Assurance Company, for so much ascertained loss on coals to this date		2,862	11 1	Debts due to sundry persons	15,023	18 9	
				Unclaimed dividends	1,008	8 2	
				Deposit account	1,036	8 0	
							37,851 18 7
		£589,032	6 0				£589,032 6 0

Abstract of Revenue and Expenditure, Half Year ending December 31, 1867.

By Revenue derived from gas and meter rent	£60,178	9 10	
Sale of products, less stock on hand, June 30 last	14,855	18 0	
Interest on deposits and transfer fees	264	3 1	
			£75,298 10 11
To Coals carbonized	£40,135	13 2	
Wages	7,738	11 4	
Salaries—directors, secretary, and clerks	2,930	15 9	
Charges	2,088	18 5	
Rent and taxes	1,747	19 8	
Lime used in purifiers	745	4 8	
Wear and tear	2,979	4 6	
Ditto—repairing meters	937	10 0	
Interest paid on bonds	2,100	12 9	
Bad debts	783	16 6	
			62,188 6 0
Net gain			£13,110 4 11

The CHAIRMAN moved the adoption of the report and statement of accounts, and said the report detailed so fully the working of the company that he should confine his remarks to the question of the re-election of the four outgoing directors. He was aware some of the shareholders thought the number of directors too large. The Act of Parliament named fourteen as the number of directors for the company, and the shareholders elected the full number. One of those so elected, Mr. Elliot, had since gone to a better place, and the vacancy had not been filled up. The existing number of thirteen was to be reduced in the progress of time by death or resignations until the number (nine) would be reached. They all felt it would be ungracious to displace any member of the board. But the directors, sympathizing with the shareholders upon the unavoidable reduction of dividend, had come to the unanimous conclusion of reducing their fees to the amount that would be payable if the board consisted of only nine members. It was resolved to take £50 off the allowance of each director, thereby saving £600 a year to the company. Many of the directors were large shareholders, and if they could have given a larger dividend they would have done so. But he, for one, and he was sure all the shareholders, would rather have a 6 per cent. dividend fairly earned than a higher dividend paid. After referring to his intended resignation, the chairman concluded by observing that the concern was one that required active and energetic men to manage it, and no body of men could discharge their duties with greater zeal and activity than did the directors of that company.

Alderman MOYLAN seconded the motion.

Mr. SMYTH said he would not have attended on that occasion had it not been for a variety of rumours which had been afloat for the last month. He made it his business to inquire into the truth of those rumours, and he found there was not the slightest foundation for any of them. In fact, he must say they appeared to him to be gross misrepresentations, circulated for the purpose of creating dissatisfaction amongst the shareholders, and depressing their property in the market. He trusted the meeting would unite with him in exposing and denouncing such nefarious practices, and that the result of that meeting would be to prove to the public that they had every confidence in their property and the fullest confidence in the board that presided so ably over the affairs of the company. They were all aware of the difficulties the company had to encounter for the last twelve months. In a few months more, when the works were completed, they would have a concern second to none in the United Kingdom, and he believed that in some twelve months they would be receiving 10 per cent. dividend. He thought their interests were perfectly safe with the board, and it would be most disastrous to the concern to remove any of them. He hoped the meeting would not do anything to disturb the harmony that existed, and which was most essential to the prosperity of the company.

Mr. J. D'ARCY referred to a statement made by the chairman of the Midland Railway Company, at the last half-yearly meeting, that they could not come to terms with the Alliance Gas Company for a supply of gas to their establishment, and that they were making their own gas by contract with Mr. Edmundson, thereby saving £200 a year. He thought that it was a matter which required explanation.

The resolution was then put, and carried unanimously.

The CHAIRMAN moved that a *pro ratâ* dividend (free of income-tax), at the rate of 6 per cent. per annum, upon the several classes of shares, be declared, the same to be payable on and after the 22nd of April next.

Mr. LEA seconded the resolution, which was passed unanimously; and the outgoing directors were severally re-elected.

Mr. LEA gave notice that he would move, at the next half-yearly meeting, a resolution that the qualification of a director should be shares to the value of £1000.

After some conversation upon the constitution of the board, the retiring auditor, Mr. Hyland, was re-elected.

Mr. STEVENSON said he thought it right to refer to an observation made by Mr. D'Arcy in reference to the lighting of the Midland Railway. Up to the passing of this company's Act of Parliament, they were in the habit of allowing large consumers, such as railways and monster houses, a discount of 10 per cent. upon the consumption. It was found, upon making up the half year's accounts, that the cost of material for producing 16-candle gas was so great that the company could not afford to continue this discount any longer. The consumers got notice, previous to the end of the quarter, that at the end of the next quarter the discount would be discontinued. The Midland Railway were in the habit of getting this discount, and they were dissatisfied when it was abolished; they therefore made an arrangement with a private individual to supply the company with gas. With respect to the policy that influenced the board, it was not for him to speak. They had a perfect right to do what they thought would best serve the interests of their shareholders, but he would say, with all respect to the directors of the Midland line, that it was scarcely fair on their part, acting as they were under an Act of Parliament, to do what they had done to this company. They directed Mr. Edmundson to convert the premises of the Midland Company into a gas manufactory for supplying their establishment, and this was contrary to the spirit of an Act of Parliament which gave this company a right to supply gas for sale in certain districts, including the district occupied by the Midland Railway, and he thought it was due to the directors of this company to state these facts. As soon as the directors of the Midland Company got notice that the discount would be discontinued, the directors of this company received from them a communication asking them on what terms they would continue to supply the gas. It was considered by the Alliance Company that if they continued to supply the Midland Company at a discount of 10 per cent. they should do the same to all who paid over £100 a year, and as it could not be done to all it should not be done to one. The giving of the discount involved a sum of close to £2000 a year to this company.

On the motion of Mr. D'ARCY, a vote of condolence with the family of their late respected engineer, Mr. Lalor, was unanimously agreed to.

On the motion of Mr. LEA, seconded by Mr. WATERHOUSE, the thanks of the meeting were given to the directors for the care and attention bestowed by them upon the affairs of the company.

A vote of thanks was also given to the CHAIRMAN, who, in responding, said he hoped the shareholders would live to see this vast concern a credit to the country. Many observations had been made at various times about English directors managing Irish companies in London. They had now the management in their own city, and he hoped and trusted that Irishmen would justify the confidence reposed in them.

The meeting then terminated.

IMPERIAL GASLIGHT AND COKE COMPANY.

The Half-Yearly General Meeting of the Proprietors of this Company was held at the Offices, John Street, Bedford Row, on Thursday, April 9—E. V. RICHARDS, Esq., the governor, presiding.

The SECRETARY (Mr. H. Chubb) read the advertisement convening the meeting, and the corporate seal was affixed to the register of proprietors.

The following report and statements of account were taken as read:—

Your directors submit to you the accompanying statements of the accounts of the company, for the half year ending the 31st of December last; and it is satisfactory to observe that they exhibit a more favourable result than those of the previous six months.

The outlay for "wear and tear" continues to be in excess of the ordinary rate of expenditure under that head, it having been found necessary to carry on those alterations at the company's works, which (as your directors explained in their report of October last), they had been compelled to make, in consequence of the refusal of Parliament, in three successive sessions, to grant the company power to procure additional land and erect new works, from which to supply the increasing demand for gas.

The sum required to pay dividends for the half year, at the rates of 10 and 7 per cent., is £68,425 11s. 8d., and the balance of profit, as shown by the accounts, is £60,391 2s. It is therefore necessary to take £8034 9s. 8d. from the reserve-fund in order to make good the deficiency.

Your directors have again applied to Parliament for power to erect new works at West Ham, and to raise additional capital, for the purpose of enabling the company to comply with the obligations imposed upon them. The bill is substantially the same as that submitted to Parliament last session.

There are at present three bills before Parliament which affect the rights and interests of the metropolitan gas companies.

1.—The Subways Bill, which passed through the committee of the Commons last session too late to be committed to the Lords, and has been revived in the Commons this session.

2.—A bill promoted by the corporation of London for power to erect gas-works of their own, and to supply with gas, in competition with the existing companies, the City and the Metropolitan Cattle Market at Islington, which latter place is situated in the district lighted by this company.

3.—"A bill to amend the Metropolis Gas Act of 1860," introduced by an independent member. This bill, which adopts many of the suggestions of Mr. Cardwell's committee of last session, contains several provisions inimical to the interests of the gas companies and subversive of their existing rights.

Each of the above-mentioned bills will receive the anxious attention of your directors, who are still induced to believe that Parliament will not yield to the unjust attacks which are being made upon the property of the metropolitan gas companies, but will maintain that good faith which the shareholders confidently relied upon when they invested their capital in those useful undertakings.

Your directors have to report that Mr. Joseph Pugh has retired from the board, and that they have elected Mr. Ulick John Burke a director in Mr. Pugh's place; at the same time they have to announce that Mr. James St. George Burke, before the election of his son, Mr. Ulick John Burke, had intimated his intention to retire from the board, and has only been induced to retain his seat during the present session at the request of his co-directors.

Revenue Account, for the Half Year ending December 31, 1867.

Dr.		*Cr.*	
To Coals consumed	£134,873 17 4	By Gas-rental	£250,049 14 11
Wages for manufactory	24,417 9 1	Meter-rental	934 14 10
Purifying, oil, and sundry stores	3,661 4 3	Coke	47,647 13 11
Wear and tear	39,032 14 11	Tar	5,843 0 1
Rent, rates, and taxes	7,101 9 7	Ammoniacal liquor	981 18 10
Directors and auditors	1,328 15 0	Interest	4 4 2
Salaries and collectors commission	8,220 15 2		
Stationery, printing, and general charges	2,670 19 6		
Bad debts	1,870 16 8		
Law and parliamentary charges	1,827 13 10		
Compensation for damages	13 0 0		
Profit and loss account	80,442 11 5		
	£305,461 6 9		£305,461 6 9

Profit and Loss Account.

Dr.		*Cr.*	
To Dividend to June 30, 1867	£67,576 6 3	By Balance from last account	£37,646 14 0
Contingency-fund	1,500 0 0	Reserve-fund	29,929 12 3
Interest on bonds, debentures, and paid-up shares	18,551 9 5	Contingency-fund	3,019 0 0
Parliamentary charges	3,019 0 0	Revenue account	80,442 11 5
Balance—being the profit for the half year	60,391 2 0		
	£151,037 17 8		£151,037 17 8

Balance-Sheet.

Dr.		*Cr.*	
To Investment	£1,847,828 11 5	By Capital, joint-stock	£1,403,984 5 0
Reserve-fund invested	50,340 14 11	Proprietors 10 per cent. bonds	130,000 0 0
Contingency-fund ditto	38,992 7 1	Debenture capital	277,000 0 0
Cash for balance on hand	20,558 10 1	Amount paid in anticipation of calls on 7 per cent. shares	155,458 0 0
Sundry debtors for gas, coke, &c.	192,006 8 1	Reserve-fund	50,340 4 11
Coals, coke, and stores, for stocks on hand	53,617 8 0	Contingency-fund	37,473 7 1
		Interest due on bonds, debentures, and paid-up shares	18,290 13 2
		Treasurer	25,000 0 0
		Sundry creditors, for goods supplied to company, &c.	45,406 2 5
		Profit and loss	60,391 2 0
	£2,203,343 19 7		£2,203,343 19 7

The GOVERNOR, in moving the adoption of the report, expressed his regret that upon the present as upon the last occasion the balance of profit and loss was insufficient to pay the prescribed rate of dividend upon the two classes of stock. But he congratulated the proprietors to this extent, that the deficiency was very much less on this half year as compared with the last. It must also be borne in mind that they had now to pay £7757 more for dividend and interest upon their capital, and if the £7757 were were deducted from the £8034 they required to take from the reserve-fund, it would be found that the balance of profit and loss very nearly arrived at the sum which would have been equal to the last half year's dividends, the deficiency being only £277. The reason why the wear and tear account was so high he explained at the last meeting, and he stated at that time that in all probability the amount, though still large, would be reduced in the future. The present accounts showed a reduction in that item, and he was sanguine enough to think that even a more favourable result might yet be anticipated. In their report the directors had mentioned that there were three bills mainly affecting metropolitan gas interests, but he observed that in addressing the shareholders of other companies the chairmen had also talked of a fourth bill—viz., a bill for an amalgamation introduced by the gas companies themselves. He should not, indeed, have mentioned the other bill, because he considered that it was entirely shelved, and he might say that the Imperial Company had been consistently opposed to amalgamation, considering that it might probably be detrimental to their interest. He knew nothing about the policy which might be necessary for other companies, but, as regarded the Imperial, looking to the fact that their district embraced an area of 25 square miles, and that their business was equal to that of some four or five other companies after amalgamation, it appeared to him that they had sufficient grounds for opposing an amalgamation. They had done so, and as he had already stated, he looked upon the bill originally promoted by the companies for effecting an amalgamation as virtually abandoned. When he said "by the companies," he meant by some of the companies, because the Imperial and one or two others had determinately opposed it. The bills mentioned in the report as now before Parliament were, first, the Subways Bill—a bill introduced into the House of Commons last session, and which passed the committee of that House too late in the year to go to the Lords. He believed the bill would be taken up exactly in the same state it was left last session. He did not think it was a bill which would materially interfere with the interests of this company, but it undoubtedly did affect gas and water companies at large; and considering the very great stake which this company had in questions of this sort, the directors considered they were bound to make common cause with the other companies, and protest against what they believed to be a most objectionable principle, although if the subways were limited to the particular streets named in the schedule of the bill, the district of this company would not be touched upon. With regard to the next bill, which was promoted by the corporation of the City of London for power to erect gas-works of their own, and to supply gas to the consumers, the directors looked upon that as a bill mainly affecting the City companies; but it so happened that the promoters proposed to light the Islington cattle market, which was in the Imperial Company's district, and this gave them a *locus standi* to oppose the bill in committee. The bill, no doubt, was introduced in consequence of a sort of suggestion by the select committee of last session, by which local authorities appeared to be invited to come in and compete out of the public rates with private enterprise. What might happen before the committee—whether the bill of the corporation ever would be pressed forward or not—he could not say; but if it were, and if it in any way affected the interests of this company, the directors would watch it narrowly, and give all the opposition to it in their power. The first bill to come on was that mentioned last in the report—viz., the bill to amend the Metropolis Gas Act, 1860. This bill was introduced by Mr. Morrison, the member for Plymouth, and there were two other names on the back of it. This bill contained some most objectionable clauses, but he should not discuss them, because he bore this in mind, that nothing he might say on the present occasion could possibly affect the shape which the bill would ultimately assume if it became law. As in the proceedings before the committee anything he said might possibly be used to the disadvantage of the companies, and could not possibly be to their advantage, he thought the proprietors would agree with him that a judicious silence was the best course to pursue. He might, however, state that the bill gave a permissive power of purchase and sale as between the companies and the municipal bodies—viz., the Metropolitan Board outside and the Commissioners of Sewers inside the City, but it provided that if they bought one undertaking they would be compelled to buy all the others. There was also a variety of clauses touching amalgamation, from which, when proposed by some of the companies, the directors of the Imperial Company materially dissented, for the reasons he had already given. There were also clauses a good deal resembling those under discussion last year, with reference to the excess of profits over and above the sum applicable to dividend. It was proposed that the right to pay back dividends should be confined to one year; the suggestion of the committee last year was that it should be removed altogether. The Gas-Works Clauses Act contained no limitation of the period during which the deficiency in back dividends should be made up out of future profits; the Metropolis Gas Act, 1860, limited the period to six years; the committee of last year proposed to take away the right altogether; the bill of the present session restricted it to one year. It was of no use for him to express any opinion on the subject at this meeting, but it did appear to him a very gross violation of that contract upon the faith of which the capital invested under the Act of 1860 was subscribed. As he remarked before, he did not think it worth while to discuss the matter now, as it would have to be discussed in committee, and the directors would there do their best in endeavouring to counteract any injustice which the provisions of the bill might seem to involve. They had put at the end of their report a clause which was dictated by what, perhaps, he might say was a sanguine hope—that Parliament would not do the gas companies an injustice; but he could not help feeling that the tendency of the committee last year was of a most hostile character, and it would be the endeavour of the directors to prevent the committee of this year—three of whom were members of the former committee—from committing any further injustice. He might just state that the standard of illuminating power in the bill was 16 candles, and the maximum price 3s. 9d., with certain machinery for reviewing that price if it should be found insufficient. These were details of the bill with which he did not propose to trouble the meeting, and he thought the proprietors would agree with him that the plan he had adopted was the best one. He concluded by moving formally—"That the report and accounts be approved and entered on the minutes."

Mr. WATSON (deputy-governor) seconded the motion.

Mr. VILLEBOISNET approved of the course taken by the governor in the remarks which he had made, but thought it right to express an opinion that it was very unjust on the part of the promoters of the last bill referred to, to lay upon the companies the obligation to supply an improved quality of gas at a reduced price, and at the same time to prohibit them from making up out of future profits any deficiency of dividend which in all probability would be entailed upon them during the first few years after the proposed change. It appeared to him that the companies had a good cause; and that, when their position was properly understood, they must be successful in defeating the attempts which were being made to damage their interests. As the directors would be requiring additional money on capital account, he wished to be informed whether there was any prospect of a call being made on the 7 per cent. shares.

The GOVERNOR said the directors were quite convinced of the justice of their own position, but unfortunately they were not the judges in this matter. All they could do was to hope for the best, and to watch the interests of the proprietors to the utmost of their power. With regard to the inquiry respecting a call, he could only say that he did not see any immediate probability of a call being made, because the directors had already in hand a good deal of money from the calls which had been paid in advance. With regard to the £10 shares, it would be remembered that that was a capitalization of money borrowed on debentures, and that they were called up for the express purpose of paying off debentures. At the present time there were no debentures due; when that occurred the question might arise, but, as he reminded them when that money was capitalized, they must take care that, as far as possible, justice was done to all parties, and that the money was called up in such a way as not to prejudice, or run the risk of interfering with, the payment of dividends upon the 10 per cent. shares.

A PROPRIETOR expressed an opinion that the item, "Bad debts, £1870," was rather large.

The GOVERNOR said, taken by itself, it did seem a large sum; but upon the half year's rental of the company—£250,000—it was really very small. It was less than 1 per cent., and he believed that every gentleman present who was conversant with the working of commercial companies would support him when he said that such a per centage of bad debts was unexceptionally good. The company had a trifle over 63,000 customers, and the greatest vigilance and care were exercised by the directors in regard to the collection of the revenue.

The motion was then put, and carried unanimously.

The GOVERNOR moved—"That dividends be declared for the half year ending the 31st of December last, at the rate of 10 per cent. per annum on the £50 shares; at the same rate on the £10 shares, upon which £1 has been paid; and at the rate of 7 per cent. upon the new £12 10s. shares; all free of income-tax, and payable on and after this date."

Mr. WATSON seconded the motion, which was put, and agreed to.

The retiring directors, Messrs. Christie, Cubitt, Frere, and U. J. Burke, and the retiring auditor, Mr. Yates, were severally re-elected.

A cordial vote of thanks was given to the governor, deputy-governor, and directors, for their services during the past half year.

The GOVERNOR briefly acknowledged the vote, and the proceedings terminated.

PHŒNIX GASLIGHT AND COKE COMPANY.

The Adjourned Half-Yearly Meeting of Proprietors of this Company was held at the Bridge House Hotel, in the borough of Southwark, on Wednesday, April 8—J. E. JOHNSON, Esq., in the chair.

Mr. J. A. CROOKENDEN (the secretary) having read the advertisement convening the present meeting, and the minutes of the last general and *pro formâ* meetings, the register of shareholders was sealed, and the following report and statement of accounts submitted:—

The directors submit herewith the trade account for the half year ending at Christmas last, and the balance-sheet of the company at the same period. The former may be regarded as not unfavourable, the net profit on the half year being £4093 9s. 10d. in excess of that in the preceding half year, and it may be presumed that when the company is released from the heavy parliamentary expenses to which it has been for several years and still is exposed, and when the retort-houses and other buildings recently erected are brought into further operation, by the manufacture of a larger quantity of gas, the demand for which continues to increase, the prescribed dividends may be paid to the proprietors without intrenching, as is again recommended, on the small amount of undivided profits which the company still possesses.

With the view of obtaining the desired release from these parliamentary expenses, your directors, jointly with the directors of most of the other metropolitan companies, have submitted to the House of Commons, and have had read a first time, a bill to enable the companies to form amalgamations amongst themselves, as suggested by the parliamentary committee in the last session, and for other purposes, which it was hoped would have given general satisfaction, but the second reading of it has been postponed, there being other gas bills before Parliament affecting the metropolis which may be passed in such forms as to render the Amalgamation Bill wholly or partially impracticable.

The Subway Bill has been again submitted to Parliament in the same form in which it passed the House of Commons in the last session, and will have the best attention of your directors.

Two bills have been submitted to Parliament to enable companies to place tramways along the roads in various places in and near London. Some of these were intended to be placed in your district, and your directors were prepared to treat with the promoters with the view of obtaining the insertion of clauses for the protection of your mains. The negotiation however, with respect to one of them, was closed by the rejection of the bill on its second reading.

The amount of net profit on the half year's trading is £33,972 9s. 4d., which, added to the undivided profit of £3346 16s. at Midsummer last, makes a total of £37,319 5s. 4d. to the credit of profit and loss at your disposal, out of which your directors recommend that dividends be declared at the following rates, viz.:—

On the £20 divided shares	10	per cent. per annum.
,, New stock	7½	,, ,,
,, Capitalized stock	5	,, ,,

less income-tax, leaving an undivided balance of £2219 5s. 4d.

At this meeting all the directors retire, but seven are to be re-appointed. The remaining three with the two auditors offer themselves for re-election.

Abstract of the Trade Account, for Six Months, ending December 31, 1867.

Dr.		*Cr.*	
To Coals used	£44,165 11 10	By Rental for light	£94,886 14 11
Materials supplied	11,035 19 4	Coke made for sale	20,004 4 9
Law expenses	1,058 15 6	Breeze	391 3 6
Meters—repairs and renewals	1,193 16 10	Tar	3,409 0 7
Rates, assessed taxes, and rent	2,815 18 9	Ammonia	742 6 1
Directors, £1000; auditors, £50	1,050 0 0	Miscellaneous receipts	605 9 4
Salaries	4,474 9 2		
Wages paid	16,916 8 2		
Bad debts and allowances	444 6 1		
Interest on bonds	2,885 2 0		
Ditto on loans	26 2 2		
Net profit	33,972 9 4		
	£120,038 19 2		£120,038 19 2

Profit and Loss.

Sept., 1867.—To dividend for half year ended Midsummer, 1867	£34,087 10 0	July, 1867.—By balance brought forward	£37,434 6 0
Dec. 31, 1867.—To balance carried forward	37,319 5 4	Dec., 1867.—By half year's profits	33,972 9 4
	£71,406 15 4		£71,406 15 4
		Jan., 1868.—Balance brought down	£37,319 5 4

Abstract of the Balance-Sheet, at December 31, 1867.

Dr.			*Cr.*	
For Capital of 27,000 £20 shares, paid in full (maximum dividend 10 per cent.)		£540,000 0 0	By Amount of plant at Midsummer last	£852,232 9 1
Capitalized stock, paid in full (maximum dividend 5 per cent.)		144,000 0 0	Expended this half year for extension of works	11,734 7 10
New stock, £360,000, £35 per cent. paid up (maximum dividend 7½ per cent.)		126,000 0 0		£863,966 16 11
Bonds at 5 per cent.		115,404 0 0	Investment of leasehold-fund	10,884 9 6
Unpaid dividends		119 4 3	Calls unpaid	628 0 0
Unpaid tradesmen's bills, &c.		17,420 19 7	Amount due for rental—	
Leasehold-fund		10,884 9 6	Christmas quarter £63,447 11 7	
Amount due on loan		10,000 0 0	Arrears 1,062 11 9	
Balance of profit and loss—				64,510 3 4
Undivided balance £3,346 16 0			Amount due for coke £5,711 5 4	
Half year's profit 33,972 9 4			Ditto breeze 125 9 0	
		37,319 5 4	Ditto tar 3,101 3 6	
			Ditto ammonia 863 0 6	
			Ditto sundries 2,300 12 9	
				12,101 11 1
			Stock of coals £10,213 15 0	
			Ditto coke 320 5 0	
			Ditto breeze 50 0 0	
			Ditto tar 352 7 0	
			Ditto ammonia 62 5 10	
			Ditto retorts 1,862 17 6	
				12,861 10 4
			Meters at Midsummer last £29,101 5 6	
			Additional meters 1,670 17 11	
				30,772 3 5
			Balance at treasurer's	5,423 4 1
		£1,001,147 18 8		£1,001,147 18 8

"Audited." (Signed) RICHARD DOWNS, GEO. D. GIBBES, } *Auditors.*

The CHAIRMAN: Gentlemen, I will now ask you to receive this report and these accounts. With regard to the latter there is very little to be said; they resemble very closely the accounts which were presented to you last half year. Some items are a little more expensive, and some are a little less expensive. On the whole, the working per ton of coals during the half year is a little less than it was in the preceding half. On the other side, however, the amount of gas-rental per ton is also a little less, the result of our having made the gas of a higher illuminating quality; in fact, upon the average, it has been equal to 14 candles. This little reduction of the rental brings down the profit per ton of coal to a fraction less than it was last half year; and, although the profit upon the whole operations of the company is fully £4000 more than it was last half year, you will find, upon a comparison of the two accounts, that this increased profit has been obtained almost entirely from the better price we have obtained for our coke. In fact, the coke during the preceding half year sold at a very low price indeed. I do not recollect any half year in which it fetched so small an amount of money. The very great improvement which has taken place in our profits this half year is to be attributed, as I said, almost entirely to the improved price we got for our coke. I shall be ready to answer any questions which may be asked with regard to particular items of account, but they appear to me to be so very similar to those of former half years, that I think I need not dwell upon them further. I will only say that the increased consumption of coal during the half year was equal to 2194 tons, and that the increased consumption for the whole of 1867, as compared with the year 1866, was 7782 tons. On the opposite side of the account there are but very few remarks to be made. I think you will bear in remembrance that in a former report we stated we were sadly deficient of working capital; and I need not tell you that, having raised no capital for that special purpose, and having increased our operations to the extent of more than 7000 tons in one year, our working capital is still exceedingly deficient. We have had, however, one great advantage in the past year—we have been enabled to raise money, by the assistance of our treasurers and bankers, at a very low rate of interest. We have found it more advantageous to the company and more advantageous to the public that we should raise the working capital we required by borrowing at this low rate, rather than by making a call upon the proprietors, who would have expected at least their usual dividend of 7½ per cent., whereas we have been able to obtain it at very little more than half that rate. So long as we can obtain working capital in that manner we shall not think of making a call. You will see by these accounts that there was a sum due to the treasurer at the end of the year of exactly £10,000; at the present moment the amount is £20,000; still, it is better that it should be so, than that we should raise capital upon which a larger rate of dividend would be expected to be paid. There is another item in these accounts to which I may refer, and that is the amount of bonds. The bonds, at 5 per cent., amount to £115,404. In one instance only, I believe—only one—a holder is desirous to have his money returned to him, owing to some family arrangement, and, consequently, at the present moment there are £4000 or £5000 of these bonds disposable for the proprietors. If any gentleman is desirous of having them he can communicate with the secretary, and facilities will be given for his accommodation. My friend, the secretary, however, tells me that I am a little too fast—that these bonds have been taken up already. In truth, we have never had any difficulty in obtaining the amount required under this head—we have only had to mention the matter among the proprietors, and it has been disposed of at once. So far, gentlemen, with regard to the accounts, and what I may consider represents our private affairs. But there are large affairs with which we are mixed up with the public; and in our report we tell you that we have deemed it necessary, in consequence of the proceedings in Parliament last year, during which suggestions were made that great economy might be effected by amalgamation among the companies, to take into serious consideration the question whether such an amalgamation could be formed with advantage. I confess that the more we have studied that subject the less reason have we seen to suppose that any great saving could be effected in that way. The public, however,

seem to be impressed with the feeling, since the report of the select committee last year, that such would be the case; and, as we are not willing to be hostile to public opinion, we have considered how far it could be done. The chairmen of the thirteen companies have met from time to time, and discussed the subject, and this has ended in nine of the companies agreeing to submit to Parliament a bill for effecting such an amalgamation. Four of them were decidedly averse to such a proceeding, and would not join the association. The bill was presented to the House of Commons, but it was subsequently found that the corporation of the City of London was also submitting a bill which had for its object the purchasing of the companies supplying the City with gas. Now, if that bill be carried, the nine companies associated together for the purpose of promoting the Amalgamation Bill would be reduced to seven—little more than one moiety of the metropolitan companies—and it was thought, therefore, unwise to proceed with our bill, which had been read a first time, until the fate of the Corporation Bill has been decided, because, if that bill succeeds, other and very different arrangements will have to be made. There is also another bill before the House of Commons, brought in by three members of Parliament, and, so far as we can learn, originating entirely with one gentleman, who will be entitled, if any good result comes from it, to all the credit of the measure, but who, if he involves the companies in great and unnecessary expenses, will have to bear all the blame. I think the bill will be taken up by the Metropolitan Board of Works, and very likely by the corporation. It did contain some most stringent clauses in the form in which it was introduced. You will recollect that in the bill brought in last year by the Board of Trade there were clauses which would have the effect, if I may use a modern term, of "disestablishing" us from our association and connexion with the Gas-Works Clauses Act, so far as we are connected with it under the Metropolis Gas Act of 1860. There were also clauses which would put us in this position, that if we had a severe accident —a great explosion, for example—in any one year, the whole cost of that accident must have come out of your dividends. No reserve-fund was to be allowed us, and you might have been left for one or two years without any dividend at all. That was a state of things which the companies could not approve; they therefore opposed the bill, and it was eventually lost or withdrawn. The new bill brought in this session contained very much the same provisions—viz., that our connexion with the Gas-Works Clauses Act should be terminated; and, though the clauses of the bill are certainly not quite so obnoxious as the bill of last session, they are, some of them, such that we cannot be expected to submit to. There is a clause empowering the Metropolitan Board of Works and the corporation to buy up the gas companies, it they think fit to do so, at such an amount as may be settled by a single arbitrator appointed by the Board of Trade. The companies unitedly felt that they should not be doing their duty towards the proprietors of metropolis gas shares—probably 6000 or 7000 in number, and holding a stake of the value of £6,000,000 or £7,000,000—if they consented to allow the valuation of their undertakings to be left in the hands of one individual appointed in the manner proposed. That was the first clause. Then the second clause was that any local authority should be entitled to require from the companies to be supplied with gas in bulk, and should be authorized then to dispose of that gas in their respective districts either for lighting the public lamps or for the use of private consumers. The practical effect of such an arrangement would be that the local authorities would be saved the trouble and cost of providing gas-works for themselves, and of finding sites for the erection of such works, which many of them would have great difficulty in doing; but they would positively be able to come to us and say: "You must sell us the gas in bulk, and we will supply all your customers;" and in the event of our not agreeing with them as to the price at which the gas should be so furnished to them, the price was to be settled precisely in the same way—viz., that a single arbitrator should decide what ought to be charged by us. That, of course, was a clause we could not submit to. Another clause was to the effect that, whatever pains and penalties we might be subject to arising out of any deficiency in the supply of gas, should not be considered as an expense of working the company, but should come directly out of your dividends. That we consented to; we said we were content that the proprietors should be punished for all the bad gas we sold. But the clause went further, and provided that in the event of an explosion or accident by which the companies might be involved, through no fault of theirs, in an immense loss, that loss also should be paid out of your dividends. Considering the precarious nature of gas property, and how liable we are to explosions and accidents, we felt that we should not be justified in acceding to any such provision. We have had the good fortune to press our objections to these and some other minor matters, with which I need not trouble you, to a successful result, and have induced the promoters of the bill to assent to its being recommitted to a committee of the whole House, when those objectionable clauses will be struck out. Consequently the bill will go before the select committee, composed of the chairman who presided over the committee of last session, and two of the members of that committee, associated with two other members, for their consideration. There are still many points which we shall have to contest, such as the question of price, &c.; but these we are prepared to discuss before the committee, and to make out our case as best we can. What the result may be it is quite impossible for me to say, but though it may expose us to some inconvenience and loss, I have still sufficient confidence in the good sense and fairness of the Legislature, and the people of this country, to believe that our property will not be seriously and permanently injured by these proceedings. I can only say for myself that nothing has ever induced me to part with a single share. I regard this as a very good property, and I have reason to think and hope it will continue to be so. With these remarks upon passing events, in making which I trust I have not detained you to a tedious length, I will now move the usual resolution—"That the report and accounts be received."

Mr. RHODES seconded the resolution, and inquired the cause of the large "law expenses"—£1058.

The CHAIRMAN said he thought, if the honourable proprietor would remember that the company was for fifteen or sixteen days before the committee of the House of Commons last session, he would rather be surprised that the amount placed against this item was so small.

Mr. RHODES inquired the amount of unpaid calls.

The CHAIRMAN said at the present moment the amount was only £376, which would be taken from the current dividend, and after that date this sum might be considered to be paid. In answer to a further inquiry, the chairman said 5 per cent interest was charged upon the calls in arrear.

Mr. RHODES said he was very much pleased with the explanations the chairman had given, and considered that the report and accounts were most satisfactory.

Mr. HOBSON concurred in the last observation, and said that the chairman had hardly done justice to the accounts in comparing them with those of the previous half year. Comparing them with those of the corresponding half year of 1866, he found that of the increased profit of £4800 only £2800 was due to the improvement in the price of coke, so that there was actually an increased profit on the business generally of £2000. The total increase was about 11 per cent., which was exceedingly satisfactory, and showed that the directors had done right in extending the works in the way they did. He felt bound to state that the country shareholders looked upon the present report as a subject of congratulation. He was glad to learn that the metropolitan companies were sufficiently united to act together in reference to Mr. Morrison's bill, and he hoped they would succeed in getting a settlement of the vexed questions involved in the supply of gas to London in the present session. He should not have attended this meeting had he not been requested to do so, to express the opinions of some of the country shareholders respecting the evidence given by the engineer of the company upon a recent arbitration. Seeing the engineer present, he might be permitted to say that some of his friends had been very much astonished at the principle of valuation adopted by that gentleman in the case of the Weymouth Gas-Works, and to find that when asked whether he should consider the same principle was applicable to the Phœnix Company's works, he replied that three years net profits added to the structural value would be liberal payment for the whole of the undertaking. He (Mr. Hobson) thought the directors of this company must have been somewhat astonished at such evidence being given by their engineer. The opinions of the engineers of the London companies were looked to with great respect, and it was, therefore, very much to be regretted that Mr. Innes should have given evidence of so injurious a character.

Mr. INNES said he desired to make one or two observations with reference to what had fallen from the honourable proprietor. When the question was asked him, on the Weymouth arbitration, respecting the value of gas shares and the property of the Phœnix Company his replies were directed solely to the £540,000 which was their original share capital, and he did not allude in any way to the newly raised capital or to the capitalized profits. He still considered that, taking that £540,000 as the capital of the company, and adding on to it £220,000, which would about represent the three years profits of the undertaking, was not a very bad valuation, looking at the position in which gas property now stood in the market, and remembering that the value of the Phœnix shares for many years had not exceeded £30 upon the £20 paid. He did not say that as an officer of the company he was justified in mentioning anything on the occasion in question in reference to the company, and he had made an application to have it entirely withheld, because it was done without any notice, and there was no special reason why he should have remarked upon the property of this company at all. As the honourable proprietor thought that he had hastily made those observations, he begged leave to say that he most readily withdrew them; he had no desire that they should be perpetuated, and he had endeavoured to rectify the matter in the pages of the JOURNAL OF GAS LIGHTING, in which his evidence was made public.

Mr. HOBSON regretted that he had been compelled to refer to the matter at all, but it was one which in the country was felt as a very serious one, and he could only add that he should not be satisfied with a valuation which gave only £220,000 upon the original capital of £540,000 of such an undertaking.

The motion for the adoption of the report was then put and agreed to.

Mr. HORNER (deputy-chairman) moved—"That dividends for the half year ending at Christmas last be, and the same are, hereby declared and made payable out of the profits of the undertaking, at and after the rate of 10 per cent. per annum on the original shares of the company, at and after the rate of 5 per cent. on the capitalized stock, and at and after the rate of £7 10s. per cent. upon the amount paid up on the new stock of the company, deducting income-tax. That such dividends be forwarded to the proprietors so ordering them either through the Post-Office, to their address, or to their bankers; and also be payable immediately after this meeting, and afterwards at the company's offices at Bankside, on Thursday, the 9th inst., from twelve till three o'clock; the remaining dividends to be forwarded by post."

Mr. RHODES seconded the resolution, which was put, and carried unanimously.

Mr. JOHNSON having vacated the chair, Mr. BENTLEY was called upon to preside.

A cordial vote of thanks was given to the directors, all of whom retired at this meeting, but were immediately and unanimously re-elected, Mr. Johnson being again appointed chairman, and Mr. Horner deputy-chairman of the company.

The retiring auditors were also re-elected.

Mr. JOHNSON, on resuming his position as chairman, said he desired on his own behalf, and on behalf of his colleagues, to express their deep sense of obligation to the meeting for their acknowledgment of the services they had rendered the company, and of the confidence shown in them by their unanimous re-election. The proprietors might rest assured that their best energies would still be devoted to the promotion of the interests of the concern, and he trusted that on future occasions they would have no reason to receive the directors with less kindness than they had hitherto done.

SURREY CONSUMERS GAS COMPANY.

The Half-Yearly General Meeting of Shareholders was held at the Bridge House Hotel, Southwark, on Thursday, April 9—THOS. POCOCK, Esq., in the chair.

The CHAIRMAN commenced the proceedings by expressing his regret that, through a severe accident, their excellent secretary, Mr. Boddy, was unable to attend the meeting. In his absence he called upon

Mr. NOTTAGE, the accountant, who read the notice convening the present meeting and the minutes of the last meeting, after which the seal was affixed to the register of proprietors.

The following report and accounts were presented, and taken as read:—

The directors have the satisfaction of presenting to the shareholders the accompanying balance-sheet for the six months ending 31st of December, 1867, by which the net profit is shown to be £10,992 0s. 11d. Out of this the directors recommend a dividend to be declared of 5 per cent. for the half year, which will leave a balance of £492 0s. 11d. to be carried to the next half year's account.

The question of the metropolis gas supply, as the shareholders may have learnt through the usual channels of information, is still unsettled, and the directors are therefore constrained to enter upon a fresh campaign. There are three bills now before Parliament—viz., No. 1, a bill brought in by the corporation of London, which affects only the supply within the City limits. No. 2, the bill of the gas companies, based upon the arrangement made last session between the Government department of the Board of Trade and the companies. No. 3, a bill introduced by Mr. Morrison, M.P., for conferring powers of purchase upon the Metropolitan Board of Works and the Commissioners of Sewers, along with powers for the amalgamation of the gas companies, &c.

This company is among the promoters of No. 2, but that bill is for the moment suspended, in deference to the opinion of Lord Redesdale, on purely technical grounds. The main contest, outside the City, will probably be taken upon Mr. Morrison's bill, which contains provisions of an objectionable character. The directors of this company must, therefore, lend their opposition to these provisions; but if, in defending the rights of the company, opportunity is given for securing an equitable arrangement, the directors will only be too glad to bring the contest, which has so long kept gas shareholders in a state of feverish anxiety and depreciated their property, to a permanent settlement.

The directors retiring by rotation on this occasion are Mr. Benjamin Duvall and Mr. Cornelius Nicholson, who, being eligible, offer themselves and are recommended by the board for re-election.

Mr. William Westcott, one of the auditors, goes out by rotation, and, being eligible, offers himself for re-election.

Dr. *Balance-Sheet, to December 31, 1867.* *Cr.*

To Capital—				By Works, as per last balance-sheet		£260,224 17 3
Old shares	£150,000 0 0			Ditto, amount expended this half year		1,338 16 11
New ditto	60,000 0 0			Due to the company for—		
		£210,000 0 0		Gas		20,905 11 4
Bonds		47,460 0 0		Products		2,071 5 5
Sundry creditors		26,361 10 10		Sundries		235 2 4
Dividends unpaid		181 0 6		Coals in stock		1,995 12 6
Balance of revenue account		10,992 0 11		Cash balances—		
				At bankers, general account	£8,002 3 11	
				Dividend account	181 0 6	
				Cash in office	20 2 1	
						8,203 6 6
		£294,994 12 3				£294,994 12 3

Dr. *Revenue Account, for the Six Months ending December 31, 1867.* *Cr.*

RECEIPTS.			EXPENDITURE.		
Balance brought forward		£ 480 11 8	Directors allowances	£750 0 0	
Sale of gas—			Salaries of secretary and clerks	550 10 0	
Common gas, at 4s. per 1000 cubic feet	£24,388 19 9		Collectors commission and pay	261 11 10	
Public lighting and contracts	6,541 1 2		Stationery, printing, and general charges	328 4 9	
		30,930 0 11	Payment to auditors	31 10 0	
Sale of residual products—					£1,921 16 7
Coke	£6,204 0 5		Manufacture of gas—		
Breeze	216 7 0		Coals carbonized	£15,776 6 8	
Tar	990 0 8		Purifying materials	56 6 8	
Liquor	211 15 10		Supervision and labour	4,968 16 9	
		7,622 3 11	Tools and implements	252 16 5	
Transfer fees		4 17 6	Ordinary repair and maintenance of premises and plant	1,088 11 2	
					22,142 17 8
			Distribution, including service-mains, pipes, &c.—		
			Ordinary repair and maintenance	£580 13 0	
			Meters, restoring and replacing	233 18 2	
					814 11 2
			Rents, rates, and taxes		1,257 10 7
			Parliamentary and law charges		330 13 7
			Interest on bonds, &c.		1,261 0 7
			Discounts	£63 3 2	
			Bad debts	253 19 9	
					317 2 11
			Balance		10,992 0 11
		£39,037 14 0			£39,037 14 0

The CHAIRMAN, in moving the adoption of the report, briefly addressed the meeting, expressing the satisfaction which the directors felt in being able to offer the shareholders their maximum dividend. The works of the company were in a very efficient state, as no doubt Mr. Liddle, who had paid his periodical visit to them, would presently testify. The capabilities of those works were such that they could supply a very much larger demand, which they hoped in process of time would be made, so that they might be able to reduce the price of gas to the consumers. Speaking of the position of gas affairs generally, he confessed himself at a loss to see the end of the turmoil and agitation of the last few years, and deeply deplored that so much money had been expended, which could benefit no one but the lawyers. He still, however, maintained faith in the uprightness of the Legislature of this country, that they would not ignore the principles which had been sanctioned in past Acts of Parliament, on the security of which the capitals of the companies had been raised and expended.

Mr. NICHOLSON seconded the motion, and referred at length to the provisions of the bill now before Parliament, pointing out in how many particulars it violated the provisions of the Gas-Works Clauses Act and the Metropolis Gas Act, 1860. He said that no selfish considerations on the part of the companies would stand in the way of a settlement of the questions which had so long been in agitation, provided that the bases of that settlement included a recognition of their equitable rights.

Mr. LIDDLE stated that he had recently been over the works, and found them in the highest state of order and efficiency. He believed the money of the shareholders had been judiciously expended, and that their affairs were carefully watched by the directors. With reference to pending proceedings in Parliament, he hoped the gas companies of London would seek to bring matters to a settlement on the best terms they could, and rather to give way on points where the interests of the shareholders were not seriously imperilled. He had confidence in the Legislature of the country, that an act of spoliation would never be sanctioned.

Mr. BRUSHFIELD, referring to an observation made by Mr. Nicholson as to the paternity of the bill now before Parliament, denied that it emanated from the Metropolitan Board of Works. At the same time he remarked it was surprising to him to see that although on every other subject the board and the corporation were like the City griffins, always spitting fire at each other, yet in regard to the gas question they were like sucking doves—their unanimity was marvellous. He looked upon the question of the proposed transfer of the gas-works to either of them as essentially a consumers question. He knew there were persons in connexion with these bodies whose palms itched to get hold of the management of the gas supply of London, but he was satisfied, if such a measure received the sanction of Parliament, the public would never again be so well supplied as they were at present.

Mr. W. B. JAMES remarked that it was reported the Metropolitan Board had adopted a resolution directing their solicitor to take charge of the bill, and if that were so they made it their own measure essentially, and it was hardly worth disputing whether they could claim paternity; they were clearly responsible for its bringing up and education.

Dr. EVANS, as a member of the Metropolitan Board, resented the attacks made upon that body. He said that at the commencement of the session the board passed a resolution not to promote any bill on the subject of the gas supply, and they had not done so. It was true that at a recent meeting the Gas Committee recommended the board to instruct the solicitor to watch the bill introduced by Mr. Morrison, which they did; but that officer had no power to take charge of the bill. As to acquiring compulsory powers to purchase the existing gas-works, he was sure the board would never think of adopting that principle without first appealing to every local board. The great majority of the members had no desire for such power, and no resolution in its favour had been agreed to.

Mr. FRANKLIN said there was one item in the balance-sheet respecting which he should like to have some explanation. It appeared to him that there had been an increase in the amount of the "Bonds" since the last half-yearly meeting, and he thought, if the directors found it necessary to raise money, it would be better to make a call upon the holders of the new shares, who he was sure would be willing to pay it.

The CHAIRMAN said the directors were able to raise money on bonds at 5 per cent., whereas, if they had made a call for the amount required, the shareholders would expect 9 or 10 per cent. upon it. Besides the economy of the course adopted, there was another advantage in the issuing of bonds—that they could be paid off when convenient.

Mr. FRANKLIN remarked that it was an inducement to the proprietors to take up new shares, that there was a probability of calls being made, upon which the same dividend would be payable as on the old shares.

Mr. DUVALL said the effect of calling up the new shares would be to depreciate the dividends generally to 7 or 8 per cent.

Mr. BLAKE further pointed out the expediency of continuing the course adopted by the directors. If the whole of the capital were called up, and the market value of money rose to 10 or 12 per cent., the shareholders might have to put up with 4 or 5 per cent.; and if they went to Parliament for fresh capital, they would have a maximum of 7 per cent. imposed on them. Lord Redesdale confessed that it was through an inadvertence he sanctioned 10 per cent. upon their present "new share" capital.

The motion for the adoption of the report was put, and carried unanimously.

A dividend at the rate of 10 per cent. per annum was then declared, and the retiring directors were re-elected—Mr. LIDDLE objecting, while moving the re-election of Mr. Duval, to the statement in the report that they were "recommended by the board."

The retiring auditor was also re-elected.

Mr. DUVALL and Mr. WESTCOTT returned thanks for their reappointment.

A vote of thanks to the directors, which was acknowledged by the chairman, terminated the proceedings.

METROPOLITAN ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

At the Usual Monthly Meeting of the Association, in the Scottish Corporation Hall, Crane Court, Fleet Street, on Saturday evening, March 21—JOHN LIDDLE, Esq., in the chair,

Dr. LETHEBY read a paper "On the Cholera Epidemic of 1866 contrasted with former Epidemics of the Disease, and an Examination of the Question whether the Water Supply had any connexion with the Disease." After referring to the journey of the epidemic to this country, and the peculiarity of the method of its invasion, he proceeded to show, from the mortality returns, the beneficial effects of improved sanitary arrangements in the City of London. This, he observed, accords with all previous experience of the disease, for, wherever attention has been paid to the sanitary condition of a place, the force of the epidemic has been checked, and the aggregate mortality from it has been small. London, for example, which has always been in advance of other cities in its sanitary arrangements, has invariably suffered less from visitations of cholera than they have. In the epidemic of 1831-32, while the mortality from the disease in London was only at the rate of 36 per 10,000 of the population, in Paris it was no less than 235. So, also, in the visitation of 1848-49, the mortality in London was but 62 per 10,000, although at Liverpool it was 163, at Hull 236, at Belfast 154, at Limerick 114, at New York 112, at Cologne 138, at Paris 182, at Cairo 205, at Alexandria 236, at Riga 316, at Stockholm 452, and at Cronstadt 546. A like difference was observed in the epidemic of 1854, and now, also, in the epidemic of 1866.

As in former visitations of the disease, the epidemic has been singularly local—occurring with greatest severity in low-lying districts, with a sodden soil, and having a dense and poor population. In the epidemics of 1849 and 1854, the great ravages of the disease were within nine well-defined regions,

which the Registrar-General has aptly termed cholera-fields; and there, among a population of about 7 millions, the mortality was at the rate of 65 per 10,000 of the people in 1849, and 21 per 10,000 in 1854; while, in the rest of England, it was only at the rates respectively of 6 and 4 per 10,000. The same fact—namely, special localization of the disease—has been observed in every large city.

The average death-rates are inversely proportional to the elevations of the districts (as shown from tables quoted); so that, taking the mean of the mortality in London at different elevations, there was but one death from cholera in 1000 of the population residing at a height of 80 feet or more above the river, while there were 14 per 1000 among those who lived at the level of it. In the intermediate stages the death-rates are inversely proportional, and with an increasing ratio, for they are in the proportion of 81, 66, 10, 7, and 4 for every 10 feet from the level of the river. This fact was the subject of able comment by Dr. Farr, in his report to the Registrar-General on the cholera epidemic of 1849 and 1854; and he concluded his remark by saying that "no such fixed relation is formed between the density of the population, or the annual value of their houses, as is observed between the mortality by cholera and the elevation of the ground on which the people live."

But although it is difficult to obtain an exact account of the density of the population and their social condition, there can be no doubt that poverty, filth, and overcrowding, have much to do with the intensity of the disease. Even in the City of London the differences in the mean mortality of the disease in the several unions are due in great part to differences in social condition, for in the central district, where the population is generally well to do, the average death-rate during the last three epidemics was only 19 per 10,000 of the population, while in the eastern and western unions it ranged from 28 to 55 per 10,000—the average being 42. Looking also at the districts of Islington, Hackney, Clerkenwell, Kensington, and St. George's, Hanover Square, where the population is chiefly of the better class, and comparing them with the districts of St. Giles's, Shoreditch, Bethnal Green, Whitechapel, and St. George's-in-the-East, where the poor are congregated, it will be seen that, independently of elevation, there are other causes in operation, which make the death-rate of the one but 17 in the 10,000, while the others range from 40 to 67 in the 10,000.

How far the intemperate habits of individuals may be concerned in intensifying the disease and provoking its attacks is hardly discoverable; but it does seem that the mortality from it among those who were members of provident and temperance societies was much below the average; and a very remarkable fact presents itself when we classify the deaths from cholera in 1866 according to the days of the week—namely, that much the largest mean mortality occurred in the middle of the week, on Wednesdays, and the smallest on Fridays; as if the disease grew in severity from Sunday to Wednesday, and then gradually declined.

But difficult as the problem is to determine the exact value of the several circumstances which influence the severity of the disease, and especially those which give to it its marked local intensities, enough has been ascertained to indicate its general habits, and to show that it fixes itself at low levels in proximity to tidal rivers, among dense populations that are living in ill-constructed houses that are filthy, badly ventilated, badly drained, and generally defective of sanitary provisions; and the inference is that the actual agent of cholera, be it what it may, can only find congenial conditions for its full development in damp and impure air.

The theory of Pettenkofer is that the essential conditions for the active manifestations of the disease are a porous soil charged with excrementitious matter, and having a certain degree of hydration, as happens when the subsoil water has been just drawn off or is slowly retiring. All these conditions were singularly coincident with the localization of the disease in the eastern districts of London, for the soil is gravelly, and therefore very porous to air and water, and it is largely charged with excrementitious matters derived from the local tide-locked sewers. It is also remarkable that for some months before the outbreak of the disease the subsoil water had been gradually sinking in consequence of the drainage operations that were necessary for the construction of the main low-level sewer and its branch to the Isle of Dogs. Now, according to Pettenkofer, it is exactly under these circumstances that a district is most liable to choleraic infection.

Another theory which has been advanced to account for the local character of the outbreak is that the water distributed to the infected districts was charged with choleraic matter; but, looking at all the facts of the case, it is clearly evident that while none of them are discordant with Pettenkofer's theory, a large number are in open and direct antagonism to the water hypothesis. In point of fact, it is necessary, for the acceptance of such a speculation, not only that some clear proof should be given of the actual pollution of the water with choleraic matter, but also that the time of the outbreak throughout the infected district was coincident with the distribution of such water, and that it did not notably fail to produce the disease wherever it was sent. It is likewise necessary to show that the disease was strictly confined to the area of such distribution, and that the use of other water was not accompanied with like severe results.

The alleged pollution of the water rests upon a series of assumptions, many of which are in the highest degree improbable. It happened that two deaths from cholera occurred on the 27th of June, at Bromley, immediately in the neighbourhood of the East London Water-Works, though far removed from their source of supply; and it is assumed that the alvine discharges of the two sick persons were cast into the privy, and found their way through the sewers into the river Lea, where, by being diffused through a large volume of water, they passed upward against the current of the stream, and arrived opposite an open, but rarely used, reservoir of the water company; that they then soaked through a thick embankment, and so obtained access to the water of the uncovered reservoir; that on a certain day some of this water was admitted into the covered reservoir, from which the public supply was taken, and that it was then distributed to the district supplied to the company. But if, for the sake of argument, it were admitted that all this did in reality happen, it would be a curious mathematical problem to determine what was the degree of final dilution after the alvine matters had entered the sewers, then the river Lea, then the open reservoir, and, lastly, the covered reservoir; for it is not supposed that the choleraic discharges were bodily conveyed to the covered reservoir, but that only a small portion of each of the successive dilutions became mixed with larger and larger volumes of water.

Apart, however, from the improbabilities of these assumptions, it is a fact that the water which is said to have been thus polluted did not produce its effects in the several districts to which it was distributed in anything like uniformity of time or force. Suppose, by way of illustration, that alcohol or arsenic had become mixed with the water, and that on a certain day it was distributed to the public, we should expect to find that the action of the poison was not only manifested at the same time over the whole district of supply, but that it was confined to that district. Not so, however, with the water in question, for although it is not alleged to have been more than once polluted, yet the first effects in the several districts occurred at long intervals; and there were many places to which it was distributed, where there was no sign of the disease; while others, which did not receive the water, were seriously affected.

The dates of the outbreak of the disease in the districts supplied with the East London water were as follows:—Bromley, June 27; Poplar and Bethnal Green, June 30; Shoreditch and Mile End, July 7; Whitechapel, Stepney, and St. George's-in-the-East, July 14; and the East London Union, July 28. A month, therefore, elapsed between the first outbreak of the disease in the several districts. It is moreover remarkable that, while it was so violent in many of the districts of supply, it was absolutely powerless in others. The death-rate, for example, of Bethnal Green was 63 per 10,000 of the population; Whitechapel, 78; Poplar, 85; and St. George's-in-the-East, 93; whereas the districts of Stamford Hill, Upper Clapton, Walthamstow, Woodford, Wanstead, Leytonstone, Buckhurst Hill, North Woolwich, and Silvertown, were absolutely untouched by the disease, notwithstanding that they receive the same water, and at the same time.

More remarkable still, there were places in the very heart of the cholera-field, and others close adjoining it, where the residents received the same suspected water, and used it freely, without suffering in the least degree. In the Limehouse School, around which the cholera was frightfully fatal, there were 400 children who drank the same water as their neighbours, and yet there was not even a case of diarrhœa among them. In the London Hospital, which is also in the heart of the cholera-field, for it is surrounded by the districts of Whitechapel, Bethnal Green, Mile End Old Town, and St. George's-in-the-East, there was an average resident population of 463 persons, and, although they drank freely of the unfiltered East London water, yet there was not a case of illness among them.

Again, in the eastern division of the City of London, which adjoins the cholera-field, the suspected water was supplied to 161 houses, with a population of about 1732 persons, but, except in one of these houses (20, Somerset Street), which is on the boundary of Whitechapel, there was not a single death from cholera, and to verify this I have obtained the addresses of all the persons who died in the cholera ward in Bishopsgate Street. But, besides this, the disease was singularly fatal in places where the suspected water was never used. In Crown Court, Blue Anchor Yard, Whitechapel, where the water supply is from the New River, the mortality was at the rate of 284 per 10,000. In Boar's Head Yard, of the same district, which is also supplied by the New River, the death-rate was 193 per 10,000; and, indeed, there are *eighteen courts in Whitechapel*, where none of the East London water was used, and yet, out of an aggregate population of 4351 persons, there were 30 deaths from cholera, the mortality being at the rate of 69 per 10,000; that of the whole district being but 77.

Another such an instance is the case of the City of London Union at Bow. In the midst of the cholera districts it suffered in common with the whole neighbourhood, for out of 765 persons it lost 27 from the disease, which is at the rate of 353 per 10,000. But during the whole of the time the residents used no other water than that from a deep artesian well, which, on being analyzed, was found to be good and wholesome.

So that on carefully examining the facts in their relation to the water theory, we find—1. That there is no proof whatever of choleraic pollution of the water; 2. That there was no coincidence of time in the appearance of the disease in the several districts supplied with the suspected water; 3. That numerous districts receiving the same water, but situated at high level, or placed beyond the cholera-field, were entirely exempt from the disease; 4. That even in the very heart of the cholera-field there were places receiving and using the suspected water with impunity; 5. That other places not supplied with the water, but situated within the infected area, suffered equally with the neighbourhood.

I am far from wishing it to be thought that choleraic matter diffused through water will not produce disease. There is abundant evidence to show that it is often a prolific source of it; but I am anxious, in dealing with a question of so much public importance as the origin of the late epidemic, that none of the facts should be perverted, and that no hasty or ingenious hypothesis without solid foundation should take possession of the public mind. In the conduct of inquiries like this, there should be a calm, a full, and a candid examination of the facts; we should endeavour to study the phenomena in a philosophical spirit, and apply to them the tests of sound induction; we should strive also to deduce from them such laws as will not only expose the nature of the malady, but will, at the same time, enable us to treat it successfully. Rash opinions, boldly asserted and tenaciously held, though they may force themselves on public attention, rarely lead to useful results; and while they have their hold on the popular mind they seriously hinder the progress of real knowledge.

Looking back, however, on the experience gained by the last visitation of cholera, and comparing it with that of other visitations, we may fairly ask if any general conclusions may be deduced from the most prominent facts. It appears, indeed—

1. That cholera is not indigenous to this country, or even to Europe. Its home is the swampy and low-lying districts of India, where, from the year 1817, it has been native to the soil. No other tropical ground is persistently occupied by it; for, although it may visit other such localities, and for a time be severely fatal, yet it never fixes itself endemically in any place beyond the Indian Peninsula. The Delta of the Nile seems, at first sight, to be as congenial to it as the banks of the Ganges and the Hooghly; but, although cholera visits it in its migrations, it never permanently occupies it.

2. That in its journey from India it always follows the lines of traffic, moving from port to port along the coast, and passing inland by the track of navigable rivers. Until the last visitation, its course from India was always the same; but the rapid advance of commerce has changed its route, and made it pass at once from the eastern frontiers of Asia to southern and western Europe.

3. That it is always imported into this country from an infected district; generally from Holland or the ports of the Baltic.

4. That the visitation is not preceded by any remarkable condition of the atmosphere; for, although in the epidemics of 1832, 1848, and 1854, the weather was warm, the barometric pressure high, the air stagnant with prevalent mists, and there was but little rain, yet in the visitation of 1866 the condition of the weather was almost exactly the reverse of this—for the barometer was generally low, the season was cold, the atmosphere was constantly in motion, with frequent gales, and there was much rain.

5. That although the disease is of tropical growth, and is generally most severe in its manifestations during the summer and autumn heat, yet it is not always checked by the cold of winter. The epidemic of 1830 was terribly fatal at Moscow during the winter of that year. The same was also the case at Berlin in 1832; and the epidemic of 1849 was at its height in Glasgow, Paisley, and other towns of Scotland, in the middle of winter; so also, in the epidemics of 1854 and 1866, the deaths from cholera at St. Petersburg were very numerous when the thermometer was below the freezing point. It may be that the conditions as to temperature and

moisture within the houses at this time were not very different from those of summer time.

6. That the advent of the disease is generally marked by some increase as it were of the zymotic force. It is difficult to judge of the general condition of the public health at the time of the visitation in 1832, but at the coming of the epidemics of 1848 and 1853, there was an unusual amount of zymotic disease. At Moscow and St. Petersburg, and in several Russian towns, the outbreak of 1848 was preceded by a general prevalence of influenza and of intermittent fever; the latter disease, in many continental cities, taking the place of typhus in this country. Diarrhœa also, in the European cities first attacked, was generally prevalent before the actual outburst of the disease. At Berlin, intermittent fever, diarrhœa, and dysentery, but especially diarrhœa, were epidemic. The same diseases, but particularly intermittent fever, scarlet fever, and influenza, were prevalent at Hamburg. In London there had been, during the preceding five years, a progressive increase in the whole class of zymotic diseases—amounting to an excess of 31 above the average—the diseases which chiefly contributed to this excess were typhus, scarlet fever, influenza, and diarrhœa. A like increase in nearly the same diseases preceded the epidemic of 1854, as if the public health was below the standard, and the conditions existed for the development of zymotic maladies. Not so, however, at the coming of the last epidemic, for, excepting a very slight increase in the proportion of deaths from typhus and small-pox, there was nothing to indicate an unfavourable state of the public health; and diarrhœa, the common precursor of cholera, was much less prevalent and fatal than usual.

7. That the *habitats* of the disease are low and marshy ground along the margin of tidal rivers, where the soil is porous and is sodden with animal excreta, and where the population is dense and not of cleanly habits. It has, however, its eccentricities of selection; for sometimes it will fix itself on one side of a street, and not touch the other; or it will localize itself in one ward only of a prison, or lunatic asylum, or workhouse. There is, no doubt, a sufficient reason for this, but at present its capriciousness passes our comprehension.

8. That when it attacks a place it always commences with a few straggling cases; it then rapidly increases in violence, and gradually abates. The circumstances which give intensity to its action are entirely local, as the altitude of the place, the density of the population, and its sanitary condition. The altitude of a place appears to have the largest influence, and next to this the density of the population. In the epidemic of 1849 this was well exemplified by the duration of the disease, for in 41 registration sub-districts, each with a population of less than 10,000, the average time of the epidemic was but 81 days; in 44 sub-districts with from 10,000 to 20,000 inhabitants, the mean duration of it was 108 days; and in 35 sub-districts with from 20,000 to 30,000 persons, it was 117 days. But it has its caprices in this respect, for in the three epidemics of 1849, 1854, and 1866, the time of its reaching its greatest intensity in London was 14 weeks, 9 weeks, and 5 weeks respectively, and the duration of the disease was equally variable, the last epidemic remaining with us but six months, while in former visitations it was here for more than a year. The influence of sanitary measures may have had something to do with these results, for their beneficial action has everywhere been abundantly proved.

9. That as regards the individual attacked by the disease, it has been generally observed that he has suffered from diarrhœa for one, two, or three days before the setting in of serious symptoms; and this is ordinarily amenable to treatment.

10. That the period of incubation of the disease—that is, the time which elapses between exposure to infection and the coming on of well-marked symptoms—is variable, although it probably ranges from three to eight days.

11. That the duration of an acute attack, when the symptoms are fully developed, is rarely over a day, while that of common English cholera is not less than three days, and of ordinary diarrhœa six days.

12. That the mortality is always most severe at the beginning of an epidemic, when, as in the London Hospital, it may amount to 85 per cent. of those attacked; whereas at the end of the visitation it is much less severe, and may not exceed 37 per cent. Throughout the whole of the epidemic, however, the mortality has generally been from 41 to 50 per cent., excepting when, as in continental cities, the sanitary conditions are unfavourable, and then it may amount to from 60 to 70 per cent.

13. That the disease is only infectious in the sense that the alvine discharges of the sick are capable, in all probability, of communicating the disease to the healthy. Observation, indeed, in every part of the world, leads to the conclusion that they are the sole agents in propagating the disease; but the exact element, or the *materies morbi*, which is thus concerned in communicating it is not known. The researches of Dr. Parkes in this country, Dr. Thome, of Cologne, Professor Klob, of Vienna, and Professor Hallier, of Jena, have shown that the alvine discharges of persons sick of cholera contain myriads of low cryptogamic organisms of the nature of a minute microscopic fungus, which is capable of rapid growth and multiplication within the human intestine, and which feeds on and destroys the mucous coat of the bowel. It would seem, too, from the experiments of Dr. Thiersch, of Munich, and of Dr. Sanderson, of London, on mice fed with paper saturated with choleraic matter, that the alvine discharges are not infectious in their fresh condition; but that, up to the fourth day, and up perhaps to the eighteenth day, they possess infectious power. If further experiments give a conclusive value to these results, their importance cannot be over-estimated; for it points to the means of at once arresting the course of the epidemic by the quick destruction of the alvine discharges, and of all things that are soiled by them.

14, and lastly. It is unquestionable that active sanitary measures, employed even during the visitation of an epidemic, are of the greatest value in checking its course.

The CHAIRMAN said he was sure that he only expressed the opinion of the meeting in recording a vote of thanks to Dr. Letheby for the admirable paper which he had read.

The discussion was opened by

Mr. RATCLIFFE, who said he was considerably surprised at the statements contained in Dr. Letheby's paper. It certainly appeared to him that a paper which professed to discuss the question of water supply, in connexion with the recent epidemic, should deal with the facts of the case, which Dr. Letheby seemed altogether to have passed over. When he (Mr. Ratcliffe) commenced his inquiries for the Privy Council, on the outbreak of cholera in the east of London, the position of the question was this: Although it had been generally assumed that there was some connexion with the appearance of the epidemic and the water supply, yet the engineer of the East London Company had stated positively and deliberately that under no possible circumstances could water polluted by cholera poison have been distributed from their works; that the reservoirs at Old Ford were free from all pollution; and that at no time had there been distributed in the east of London anything but pure water from that place. This statement seemed to him to set aside the notion of any possible connexion of the water with the epidemic, and it was with that feeling he entered upon the investigation. His investigation was an investigation of facts, and by a process of exhaustion it was pursued until every possible source of the disease was examined, and he was driven back to the water supply as the sole cause. Having come to that conclusion, he saw Mr. Greaves, laid the facts before him, and discussed them with him. Then came out the very important admission that on a particular day—a fortnight before the commencement of the outbreak in the east of London—for a special reason, impure water from a certain uncovered reservoir liable to pollution from the river Lea had been admitted into the service reservoir and distributed. The first undoubted cases of Asiatic cholera in London were the two cases in Priory Street, Bow. They were made the source of inquiry by himself and other gentlemen. His own investigations extended to six visits, during which he saw every member of the family, and every person who had anything to do with the patients. The result proved that they died of cholera; that the ejections, which had been large, were cast into the privy, and washed down freely with water. The connexion of that privy with the river Lea was inspected along the whole route, and there could be no doubt that, in 24 hours after the deaths of these persons, the ejections must have passed into the river. Dr. Letheby had spoken of this matter passing up the river against the stream. But at this spot the Lea was a locked stream; the tide was admitted at the flow, and all the matters contained in the water were swept up the river. When the tide ebbed, the lock-gates were closed, and only the surplus water was washed back over the weir. The Lea was the common sewer for the district; the weather at that time was very hot, and this excreta was poured into the river at the very worst time. He believed it to be a fair assumption that the river opposite the East London Water Company's works was tolerably well laden with choleraic poison. Could it get into the reservoirs? There was the hypothesis that there might be a crack between the old and the service reservoirs. That had not been solved. When the gates were opened between the service and the uncovered reservoir, the water might have poured in from the river Lea. But he put that theory aside. With regard to the uncovered reservoirs, they were sunk in gravel, and the greater portion not known to be puddled at all. The rise of the tide for two or three days was 3 feet above the level of the reservoir. When Captain Tyler afterwards examined the covered reservoirs, which had been carefully puddled, he found leakage into them of a very peculiar character. When, therefore, he (Mr. Ratcliffe) found that the river Lea had been polluted for a certain period—that the reservoir from which the unpurified water had been drawn was liable to pollution from the river—it seemed to him extremely probable that there was some connexion between the supply of this water and the outbreak of the disease. It was perfectly clear, from the localization of the disease, that the distribution of this water was not common to every portion of the district. Mr. Greaves admitted that filtered water had been supplied at that time to the outlying portions of the district. The most important argument which had been advanced against his (Mr. Ratcliffe's) argument was that advanced by Mr. Orton. Some portions of the district escaped the cholera altogether. He could not conceive a mode of escape except that of the water being unaffected. Mr. Orton suggested that the filthy condition of portions of the east of London might account for the outbreak, and that the filth played a most important part in aggravating the disease in those portions there could not be the least doubt.

Mr. ORTON said he had gone into this question practically, and in his report had enumerated a great number of factories, workshops, &c., in which some of the people drank the water and some not, but all living within the influence of the Old Ford supply. The result of his investigations had been to confirm him in the opinion that the water had nothing to do with the aggravation or with the bringing about of the cholera in the east of London. On the contrary, as he had stated, so far was this from being the case, that he believed the water of the East London Company had rather been a source of exemption. With regard to the filth and the state of the sewerage in the district to which Mr. Radcliffe had alluded, he supposed that question had not been investigated until he entered upon it. As the water theory was unequal to explain the matter, he thought he could find materials to work upon in other directions, and he had not been disappointed. So impressed was the board which he represented with the correctness of his investigations, that they had caused a copy of his report to be sent to every vestryman in the east of London. On inquiry, he found at the West Ham pumping-station that the sewage of 70,000 or 80,000 inhabitants was pumped into the Lea Creek at any time of the day or night. A little way off from this discharge was a lock, and that lock opened into the Lea Cut, by means of which 20,000 tons of this filthy water was sent down into the very heart of Limehouse every day in the course of the ordinary traffic. During the spring tides the lock and the Lea Cut formed one continuous piece of water for four hours daily for six months every year. So far as regarded the West Ham pumping-station, it would be seen at once that in this alone the east of London differed very materially from other parts of the metropolis. Then, again, with regard to the sewers, it had be n stated that they differed from no other part of London, but this statement he proved to be erroneous, and asserted his belief that for filth the Limehouse district had no equal in any district of the metropolis. He quite agreed with Dr. Letheby that the water supply had nothing to do with the cause of the epidemic. His opinion was that it owed its origin to certain atmospheric influences, and was exaggerated by nothing else than the sewage filth and the emanations from the polluted rivers in the east of London.

Mr. HAWKSLEY, responding to a call from the chair, said it had been his fate to be mixed up with cholera ever since the year 1831, and he had also practised as a water engineer on his own account for a period somewhat earlier than that; he had, therefore, had a great many good opportunities for ascertaining, so far as observation would enable one to ascertain, whether water had been the cause either of the origination of the disease or of its subsequent dissemination. He was bound to say he had come to the conclusion that, except in certain very extreme cases—as in the case of distinctly polluted wells—the supply of water had nothing whatever to do with the origination or the propagation of cholera. There were some very remarkable instances of the non-propagation of cholera (one could only judge in the negative form) which had fallen within his own observation. He would not presume to occupy time by narrating a great number of these cases, but would take occasion to mention one or two very remarkable instances. In the year 1849, as was known to every gentleman in the room, cholera raged in what was called "the black country"—Wolverhampton, Bilston, Wednesbury, &c. He was there at the time, and he was there on water-works business, and it happened that the cholera was so fatal that the people were obliged to camp out in the fields. The excreta from all those towns, so far as they could reach any river at all—and no doubt large quantities did reach it—were entirely discharged into the little river Tame. The Tame was a river which had a run of about 20 miles, through all these towns, before it arrived at Birmingham. The cholera was exceedingly fatal in

Wolverhampton, Walsall, and Bilston, but in Birmingham, although that very large town was supplied with water direct from the Tame by pumping-engines, there was but one case of cholera in the whole town, and that was a distinctly imported one. Just previously he had made some large water-works for the supply of the city of Coventry, about 10 or 12 miles distant from Birmingham. The supply was obtained from beautiful springs and deep wells situated above the population, and therefore pure; nevertheless, although there was no cholera epidemic, or contagion, or mortality, in Birmingham, it was very fatal in Coventry. And there were many other strange and analogous cases. The cholera was very severe at Nottingham, which was built on the side of a hill, where there was an exceedingly good water supply, and where everything seemed favourable to the non-propagation of the disease. At the same time Leicester—in the same central district, with no water supply at all and no sewerage, where all the refuse went into cesspools, and where the water was withdrawn from a gravel bed into which all the cesspools discharged—was wholly free from the epidemic. He could relate a good many such cases at home and abroad. He had had the opportunity of personally tracing the cholera down the Baltic. He was in Copenhagen when the great destruction of life by cholera took place in 1853 and 1854, and where, before he left, in that town of little more than 100,000 inhabitants 4050 had died. The cholera had been very destructive in the Baltic in 1831 and 1832, and again in 1849, but had never touched Copenhagen, although the town had no competent water supply, and no sewerage at all, and the substratum of the whole town was one mass of ammoniacal filth—so much so that, if dug up in a close place, the tears would actually roll down the faces of those who were near, from the action of the ammonia, and money would become black in one's pocket. But, in 1854, the cholera settled down upon that place as if it had been a cloud, and was intensely destructive. It left the place after apparently having done its work there, and had not visited it again. It would be very easy for him to trace, as Dr. Letheby had done, the progress of the cholera through Central Asia, after it left India, and down the Baltic, which seemed to be its natural course; coming generally by Moscow and St. Petersburg, and then dividing into two streams—one coming by Warsaw, Berlin, and Hamburg, to England, and generally landing at Newcastle, Hartlepool, or Sunderland; the other diverging to the coast of Sweden. There was this very remarkable thing in connexion with the disease. It appeared, from all the observations he had been able to make, that the period of the incubation of cholera was about a fortnight. When propagated by contagion it might be shorter, but generally speaking it would be found, if its progress from place to place was traced that this was the time it took. If it occupied more than about a fortnight in its journey from place to place it failed to be communicated, and it was owing to the quick passages now made to America, and from Suez by railway to Alexandria, and from there by steamer to Malta and Ancona, that its progress had been so rapid. After leaving Europe it was easily carried over to New York, and from thence across the American Continent to the shores of the Pacific, where it was lost. It never reached Australia or the islands of the Pacific, because it took more than fourteen days sail to get from one inhabited port to another. It uniformly began in India, and always pursued the same, or nearly the same, course, unless human intercourse and the rapidity of commerce diverted it into another channel. He had had the opportunity, both at Sunderland and Newcastle, of judging of the correctness of the conclusion that in neither instance had the cholera been propagated by the water, and he could mention scores of instances of towns which had been seriously affected by cholera where the water came by pipes from a great many miles up the country, and where it was absolutely impossible it could be contaminated. He could also mention many others in which the water was obtained on the spot, and the people did not suffer from cholera at all, although all the circumstances were those in which propagation would have been most natural. He remembered very well that when cholera was prevalent in 1849 and 1854, Limehouse, which seemed to have been so disastrously affected in the late outbreak, was almost free from the epidemic, and then singularly enough the disease located itself on the other side of the Thames, and was exceedingly destructive at Rotherhithe and Deptford, showing that cholera localized itself independent of all considerations of water whatever. He, therefore, came to the conclusion that although, as in the case of polluted wells from which water was immediately drawn and taken into the human system, cholera might be propagated by water, yet that, as a general rule, it was impossible so to propagate it. And he said this the more emphatically because, as every one knew, what was called the material of disease was very easily decomposed chemically—it was matter extremely easy to oxidize. It was well known, too, that water contained an enormous quantity of free oxygen, and that the waters of rivers, springs, and streams would at once decompose any of these matters. But the argument upon which the water propagation theory rested, and which really was an argument *post hoc, ergo propter hoc*, might be easily negatived on other grounds; and, if time permitted, he should have been happy to state some of the observations he had had the opportunity of making, in order that the learned gentlemen then assembled, and who were so well qualified to judge of the validity of an argument, might consider the correctness of the conclusions at which he had arrived.

Dr. BARCLAY suggested that Dr. Letheby's paper should be published by the association. The question with which it dealt was a very important one, and without now expressing any opinion upon it himself, he would merely say that it was a question which had been considered very much on one side.

Mr. JABEZ H. OGG remarked that there was a great deal to be said from the fungoid theory point of view, but he was of opinion that the water theory would no longer hold water. He moved—"That the further consideration of Dr. Letheby's paper be adjourned to the next monthly meeting."

The motion having been seconded, was, after some further conversation, adopted.

DR. FRANKLAND'S ANALYSIS OF THE METROPOLITAN WATERS IN MARCH, 1868.—"Royal College of Chemistry, March 28, 1868.—Sir,—I have the honour to submit to you in the following table the results of the chemical examination of the waters supplied to the metropolis during the month of March. For the purpose of comparison I append also the results yielded by Loch Katrine water, as supplied to Glasgow, and by the waters supplied to the towns of Lancaster, Manchester, Leicester, Preston, and Worthing, when submitted to the same analytical processes. The effects of the great January flood in the Thames have now nearly disappeared, nevertheless the water delivered by the Lambeth Company on the 4th instant was nearly as muddy as the samples collected in January and February. The waters delivered by the Chelsea and Southwark Companies were likewise turbid, whilst the West Middlesex and Grand Junction Companies, who also draw their supplies from the Thames, delivered water which had been efficiently filtered, and was therefore perfectly transparent. The water taken from the river Lea, and supplied by the New River and East London Companies, was also quite transparent. The amount of organic nitrogen in the turbid waters is considerably higher than in the transparent samples, it is therefore highly probable that solid particles of unoxidized sewage enter into the composition of the suspended matter in the turbid samples. The peculiarities presented by the Kent Company's water delivered at the Deptford railway station, and noticed last month, are exhibited by the sample collected on the 2nd instant in a still higher degree. The water was turbid from floating fibrous particles; its total solid impurity has increased from 59·2 parts in 100,000 in February to 70·2 parts in March. Nearly the whole of this increase is due to common salt, which, amounting to the very large proportion of 14·4 parts in 100,000 of water last month, has now increased to 23·7 parts.

Companies.	Date and Place of Collection.	Temperature in Cent. Degrees.	Total Solid Impurity in 100,000 Parts.	Organic Carbon.	Organic Nitrogen.	Nitrogen, as Nitrates and Nitrites.	Ammonia.	Total combined Nitrogen.	Previous Sewage Contamination (Estimated).	Total Hardness.
Thames.		Cent.								
Chelsea.....	Mar. 4—Cab Rank, Horse Guards..	8·3	29·0	·187	·029	·262	·003	·293	2320	18·5
West Middlesex	Mar. 4—Cab Rank, Portland Road..	7·7	30·2	·136	·012	·314	·001	·327	2830	21·4
Southwark & Vauxhall..	Mar. 4—Barclay's Brewery	10·0	32·6	·264	·032	·246	·001	·279	2150	19·7
Grand Junction.....	Mar. 4—Cab Rank, Woodstock St...	7·2	28·8	·202	·027	·278	·001	·306	2470	18·5
Lambeth....	Mar. 4—Cab Rank, Lambeth Road..	8·6	29·4	·289	·040	·248	·001	·289	2170	18·3
Other Sources										
New River...	Mar. 4—Cab Rank, Tottenham Ct. Rd.	7·5	27·4	·059	·010	·256	·000	·266	2240	18·5
East London.	Mar. 4 — Slater's, Old Ford Road .	7·2	30·0	·118	·022	·231	·001	·254	1990	20·5
Kent.....	Mar. 2 — Deptford Railway Station.	10·2	70·2	·093	·029	·399	·001	·429	3680	32·3
Loch Katrine	Feb.,1867, Glasgow		3·28	·256	·008	·031	·002	·041	0	0·3
Lancaster ...	Sept.—Lancaster .		3·54	·157	·001	·036	·001	·038	50	0·1
Manchester..	Nov.—Manchester		6·80	·242	·026	·001	·001	·028	0	2·7
Leicester....	Nov.—Leicester ..		23·7	·506	·020	·001	·001	·022	0	13·4
Preston	Dec.—Preston		14·7	·515	·040	·001	·003	·044	0	6·7
Worthing ...	Nov.—Worthing..		36·7	·162	·000	·426	·000	·426	3940	23·8
Column 1	2	3	4	5	6	7	8	9	10	11

The numbers in columns 4, 5, 6, 7, 8, 9, 10, and 11 all relate to 100,000 parts of the waters. The table is to be read thus: The Chelsea Company's water collected on March 4, at the Horse Guards cab rank, had a temperature of 8·3° Cent.; 100,000 lbs. of it contained 29·0 lbs. of solid impurity; the organic matter, constituting a portion of this impurity, contained ·187 lb. of carbon and ·029 lb. of nitrogen. This solid impurity also contained ·262 lb. of nitrogen in the form of nitrates and nitrites, besides ·003 lb. of ammonia; whilst the total amount of *combined* nitrogen in every form was ·293 lb. The above quantity of water supplied by the Chelsea Company had been, after its descent to the earth as rain, contaminated with sewage or manure matter equivalent to 2320 lbs. of average filtered London sewage. By gradual oxidation, partly in the pores of the soil, partly in the Thames and its tributaries, and partly in the reservoirs, filters, and conduits of the company, this sewage contamination had been converted into innocuous inorganic compounds before its delivery to consumers. Finally, 100,000 lbs. of the Chelsea Company's water contained 18·5 lbs. of carbonate of lime, or an equivalent quantity of other soap-destroying ingredients.—I have, &c., E. FRANKLAND.—The Registrar-General, &c."

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN MARCH, 1868.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

Names of Water Companies.	Total Solid Matter per Gallon.	Loss by Ignition.*	Oxidizable Organic Matter.†	Hardness.		Organic and other Ammonia.
				Before Boiling.	After Boiling.	
Thames Water Comps.	Grs.	Grs.	Grs.	Degs.	Degs.	Grs.
Grand Junction. . . .	20·8	1·9	1·22	14·0	4·0	0·007
West Middlesex . . .	21·0	0·8	0·29	14·5	4·0	0·007
Southwark and Vauxhall.	20·5	1·8	1·26	14·0	4·0	0·007
Chelsea	20·5	2·3	1·31	14·0	3·5	0·011
Lambeth	19·5	2·4	1·34	13·0	3·0	0·011
Other Companies.						
Kent	26·7	2·0	0·03	18·0	6·5	0·003
New River	18·5	1·0	0·25	14·0	3·5	0·007
East London.	21·5	1·1	0·34	15·0	4·0	0·007

* The loss by ignition represents a variety of volatile matters, as well as organic matter, as ammoniacal salts, moisture, and the volatile constituents of nitrates and nitrites.

† The oxidizable organic matter is determined by a standard solution of permanganate of potash—the available oxygen of which is to the organic matter as 1 is to 3; and the results are controlled by the examination of the colour of the water when seen through a glass tube 2 feet in length and 2 inches in diameter.

The samples of the Chelsea and the Lambeth waters were turbid when drawn.

H. LETHEBY, M.B.

WALSALL.—At the last usual monthly meeting of the Walsall Town Commissioners, a proposition in favour of lighting the public lamps every dark night in the year, instead of only for ten months, as at present, came on for consideration, when the deputy-clerk read a letter which had been sent by the clerk (who, owing to a family bereavement, was not present). The writer stated that he felt it his duty to lay before the meeting the danger of the

course proposed. The extension of the period of burning gas in the public lamps to twelve months in the year would, according to the estimate of the Gas Committee, involve a loss of £150. The concern at the present time was less able to bear loss than at any period for several years past. The last reduction in the price of gas would, he estimated, involve a loss on the year's profits of about £500. The tar and liquor, under the new contract, would show a loss of about £200, and the coke and lime would produce less this year by about £200. The late losses (in excess of ordinary ones) on two accounts (one gas, and the other tar and liquor) amounted to £250. In addition to these sources of weakness, from £800 to £1000 would have to be laid out in new purifiers and purifying-house, blacksmith's shop and tools, and shed for retorts, &c. Thus, with a probably diminished income, approaching £1000 for the current year, and an extra liability to pay nearly £1000, he respectfully submitted that the present was a time for rigidly economizing the resources of the board, and for carefully guarding against all avoidable loss. The badness of trade might also add an item of loss with general consumers. He therefore suggested that any motion affecting the public lamps should not be pressed this year.—Mr. Cox said he should not be acting consistently if he did not move that the alteration of which he had given notice should take place, though at the same time he felt sorry to run counter to the clerk's letter. He should never cease, so long as he remained in the commissioners, to agitate for the change, and he believed that public opinion was in his favour. He accordingly formally proposed that the alteration be made.—The motion failing to find a seconder, fell to the ground.

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum.	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano . .	10 0 0	9 0 0	11 to 12
5000	20	Bahia (Limited) . .	20 0 0	nil.	14 to 15
1000	20	Do., preference .	20 0 0	10 0 0	20 0 0
750	20	Do., do., redeemable	10 0 0	10 0 0	12 10 0
40000	5	Bombay (Limited).	5 0 0	5 0 0	4⅜ to 4⅝
10000	5	Do., third issue .	3 0 0	5 0 0	2⅝ to 2⅞
10000	20	British, Limited . (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries), Trowbridge, & Holywell.)	20 0 0	6 0 0	28 to 29
12000	50	*Chartered*	50 0 0	6 10 0	45½ to 46
6000	50	Do.	40 0 0	6 10 0	35 to 35½
10000	20	*City of London*, A shares	20 0 0	9 0 0	21¼ to 22
10000	10	Do., B shares	10 0 0	4 0 0	6 to 6½
9629	10	Do., new shares	10 0 0	9 0 0	11 to 11½
25000	25	City of Moscow (Limited). . . .	25 0 0		7 to 7½
17490	25	*Commercial* . . .	25 0 0	10 0 0	33 to 34
20000	20	Continental Union.	20 0 0	4 0 0	14 to 15
10000	20	Do., preference .	20 0 0	7 0 0	20 to 20½
5000	10	*Crystal Palace District* . . .	10 0 0	10 0 0	13½ to 14
3000	10	Do., preference.	10 0 0	6 0 0	12½ to 13
10000	10	Do., new shares.	2 10 0	7 0 0	2½ to 3
4000	50	*Equitable*	50 0 0	10 0 0	64 to 66
4000	25	Do., new shares.	25 0 0	10 0 0	32 to 33
23406	10	European (Lim.) .	10 0 0	10 0 0	13 to 13½
12000	10	Do., new shares. Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	6½ to 7
20000	10	*Great Central Gas Consumers* . . .	10 0 0	10 0 0	13 to 13½
5000	10	Hong Kong (Lim.)	10 0 0	5 0 0	8 to 10
26000	50	*Imperial*.	50 0 0	10 0 0	62 to 63
1300	100	Do., bonds . . .	£100	10 0 0	170 to 175
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	97¼ to 98
400	100	Impl. Mexican (L.)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent* . . .	40 0 0	10 0 0	50 to 53
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
7133	50	*London*	50 0 0	10 0 0	63 to 64
5610	25	Do., 1st pref. .	25 0 0	6 0 0	25 to 27
503	50	Do., 2nd pref. .	50 0 0	6 0 0	
214	50	Do., 3rd pref. .	50 0 0	6 0 0	
18781		Do., 1st pref. sk		6 0 0	
11828		Do., 2nd pref. sk		5 0 0	
12000	5	Malta & Medit. (L.)	5 0 0	4 0 0	3½ to 4
6000	5	Do., preference .	5 0 0	7 0 0	5 0 0
30000	5	Oriental, Calcutta	5 0 0	9 0 0	6½ to 7
30000	5	Do., new shares.	1 0 0	9 0 0	1½ to 1⅝
10000	5	Ottoman (Limited)	5 0 0	nil.	1⅝ to 2½
10000	10	Parà (Limited) . .	10 0 0	6 0 0	8½ to 9
27000	20	*Phœnix*	20 0 0	10 0 0	25 to 26
3600	100	Do., new	35 0 0	7 10 0	35 to 36
100	100	Do.	100 0 0	5 0 0	71 to 73
114000	8k.	*Ratcliff*	20 0 0	10 0 0	21 to 23
5000	20	Rio de Janeiro (L.)	20 0 0	10 0 0	23 to 25
6959	5	Singapore (Lim.) .	5 0 0	3 0 0	
2000	5	Do., preference .	5 0 0	7 10 0	
4800	50	Shanghai . . . . . *Sth. Metropolitan*	50 0 0	10 0 0	70 to 71
	12½	Do., new shares .	12 10 0	10 0 0	17¼ to 18
15000	10	*Surrey Consumers*	10 0 0	10 0 0	12¾ to 12⅞
10000	10	Do., new	6 0 0	10 0 0	7¼ to 8
9000	4	United General . . (Limerick)	4 0 0		2 to 2½
10000	10	*Victoria Docks*. .	5 0 0	6 0 0	
1500	10	*Wandsworth and Putney*.	10 0 0	10 0 0	10 0 0
2989	10	Do.	10 0 0	7 10 0	
316	10	Do.	6 10 0	7 10 0	
1128	10	Do.	3 0 0	7 10 0	
20000	10	Western (L.) A sh.	10 0 0	10 0 0	14 to 14¼
10000	10	Do., B shares.	6 0 0	10 0 0	8 to 8⅛
10000	10	Do., C shares.	6 0 0	10 0 0	8 to 8¼
20000	10	Do., D shares.	1 0 0	10 0 0	1½ to 2
8000	5	*West Ham* . . .	5 0 0	7 10 0	6 10 0
6000	5	Do., new shares.	3 0 0	7 10 0	3 18 0
551	10	W. Lon. Junc. (L.)	10 0 0	6 0 0	
520	10	Do., preference .	10 0 0	6 0 0	

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 12 6	2 12 4	2 7 6	3 5 0	3 5 0
1¼ and 2-inch Socket-pipes	7 10 0	6 0 0	6 15 0	6 15 0	7 10 0
2½ and 3-inch ditto	7 0 0	6 0 0	6 5 0	6 10 0	7 0 0
4 and 5-inch ditto	6 10 0	5 10 0	5 15 0	6 0 0	6 10 0
6 inches and upwards ditto	6 5 0	5 0 0	5 10 0	5 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 0 0	—	5 5 0	5 10 0	6 0 0
Ditto, 2nd ditto, cold ditto	7 0 0	5 15 0	5 15 0	6 0 0	7 0 0
Tank-plates, ¼ thick and above	6 10 0	5 10 0	5 10 0	5 15 0	6 5 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 feet—per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ditto, from 6 inches to 18 inches—each	2 0	2 0	1 9	1 3	1 0	0 9
Connecting-pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows (wrought iron)	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, ditto	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

Haswells, Nettlesworth Primrose, and South Pelaw	7s.6d
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 9
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton.	8 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	8 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	8 6
Ramsay's Newcastle Cannel	15 0
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel:—

Boghead (at Leith)	42 6
Muirkirk	27 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	31 6
Ditto (at Granton)	32 6
Arniston	27 6
Wemyss	27 6
Haywood, Wilsontown (at Granton)	23 0
Pirnie, or Methill	17 0
Lothian's Cannel (at Leith)	28 0
Myles' Cannel	23 6
Lochore Parrot (at Burntisland)	28 0
Lanemark (at Glasgow)	16 0

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

Chatham and Rochester	5 3
Cork	8s. 6d. to 9 0
Dover, Folkestne, & Ramsgate	4 0
Dublin	9s. to 9 6
Exeter Quay	8 0
Ipswich	4 6
London (from Leith)	8s. to 8 6
London (Pool)	5 4½
Lowestoft and Yarmouth	4 3
Portsmouth & Southampton	7 0
Plymouth	7 0
Shoreham	6 6
Whitstable	5 0
Weymouth	7 0

Foreign.—Per Keel:—

Barcelona	£17 10
Bordeaux	—
Boulogne and Calais	6 5
Cadiz	£13 10s. to 14 0
Cronstadt	—
Copenhagen	8 5
Genoa	17 0
Hamburg	£7 5s. to 7 10
Havre de Grace	7 10
Leghorn	17 0
Lisbon	11 10
Rotterdam	6 15
Stettin	£10 to 10 10
Trieste	15 10
Venice	18 10

SUNDRIES.

Best Nstle. Fire-bks., p. 1000, £2 10s. to £2 15 0	
Cliff's Fire-bks. (at Wortley), p. 1000.	2 15 0
Ingham's ditto (at Wortley), p. 1000..	2 15 6
Fire-clay Retorts, p. ft. run, 3s. 6d. to	0 7 0
Tough Cake Copper, p. ton	78 0 0
English Pig Lead, p. ton	19 10 0
Welsh Bar Iron (in London), p. ton..	6 5 0
Foreign Spelter, p. ton	20 5 0
English Block Tin, p. ton	98 0 0
Banca, p. ton	96 0 0
Tarred Rope Yarn, p. cwt.	1 0 0

Advertisements.

GAS AND WATER PIPES.

CLARIDGE, NORTH, & CO.,

BILSTON.

THE LONDON & WESTMINSTER METER COMPANY, LIMITED.

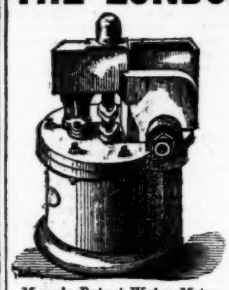
PATENTEES AND SOLE MANUFACTURERS OF

THE ABC GAS-METER.

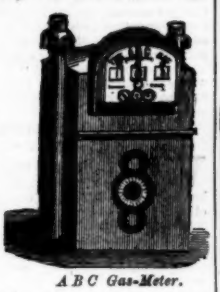
EDGE'S PATENT INDEX.

MYERS'S PATENT WATER-METER.

(A CYLINDER and PISTON.)



Myers's Patent Water-Meter.



A B C Gas-Meter.

The ABC GAS-METER shows in plain figures the money payable for Gas consumed, at well as the number of cubic feet.

MYERS'S WATER-METER is accurate in measurement, simple in action, and moderate in price.

Manufacturers of the ordinary Wet and Dry Meters, Governors, Photometers, and all other Gas and Water Apparatus.

JOHNSON'S PLACE, LUPUS STREET, LONDON, S.W.

CITY OFFICE: 2, CASTLE COURT, BIRCHIN LANE, E.C.

JOHN VICKARY,

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

WORKS—EXE ISLAND, EXETER,

Tenders his best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support he has received for the last **22 years,** during which period he has erected and extended above **200 Gas-Works.**

In addition to the numerous towns wherein he has been engaged, he begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight and Coke Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest attention or adjustment since its completion.

(Signed) PETER ADAMS, Chairman.

He has also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c. &c. At either of those works satisfactory references can be made.

He also begs particular attention to his **Improved Gas-Meters,** either **Wet, Dry, or Compensating,** the materials and workmanship of which guaranteed of the very best description, and which has gained for his Meters so excellent a reputation for these last **20 years.**

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.

Clay Retorts and Fire-Goods of every description.

Gas-Fittings of the most modern designs.

Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimate for the erection of New Gas-Works of any size furnished.

TO CORPORATIONS, GAS ENGINEERS, AND OTHERS.

HENRY ALDER,

GRANGE METER-WORKS, EDINBURGH,

Begs to intimate that he is the ORIGINAL MANUFACTURER of

DRY GAS-METERS IN CAST-IRON CASES.

The Meters are protected by Registration on the 17th of December, 1864, under the "Copyright of Designs Act."

They are much more durable, and at the same time more easily repaired than those in Tin Cases.

PRICE LIST AND TERMS ON APPLICATION.

Agent for Ireland—Mr. J. FURNESS, 3, Fownes Street, DUBLIN.

HENRY ALDER begs to call attention to the following statement:—"In a conversation, held in 1864, with the late "Mr. Adamson, the able Engineer of the Leeds New Gas Company, he pointed out to me the practicability of having "DRY METERS in CAST-IRON CASES. On my return home I worked out the suggestion, and REGISTERED a "METER of this construction on the 17th of December, 1864. Previously to the 31st of March, 1865, I had supplied "Meters in Cast-Iron Cases to Gas-Works in Airdrie, Blackburn, Brighouse, Chorley, Glasgow, Heywood, Huddersfield, "Leeds, Newcastle, North Shields, Rochdale, Rotterdam, Salford, Sunderland, &c. I need hardly inform you, in view of "these facts, that the following Advertisement, to which my attention has just been called, was read by me with feelings of "much astonishment:—'THE ONLY COMPLETE CAST-IRON CASED DRY GAS-METER.—Patented March 31, "1865.—Gas Engineers and others will find that the above Meter is made of the most durable material, also that it can be "repaired at a fraction of the cost of *any other Meter* now manufactured, all the interior fittings, as well as the case, being "fitted together with screws. Drawings explanatory of the above on application. Sole Manufacturers: FULLERTON, "SON, & Co.' I shall not characterize this. It would, however, be esteemed a great favour were you, when opportunity "occurs, to compare the Dry Meter in Cast-Iron Case, registered by me in 1864, with that named in the Advertisement. "You will then be able to determine whether the latter be only an imperfect copy of mine."

TO GAS ENGINEERS.

THE Directors of a Gas Company, manufacturing about 800,000,000 cubic feet of Gas per annum, are ready to receive APPLICATIONS from competent persons for the office of ENGINEER and GENERAL MANAGER, to whom a salary proportioned to ability and experience will be given.

Applications, addressed "GAS ENGINEER," to be forwarded to the care of the Publisher of "THE JOURNAL OF GAS LIGHTING," 11, Bolt Court, FLEET STREET, E.C.

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.

WANTED, a suitable Person as Foreman or Working Manager at the Gillingham Station. He must be accustomed to the use of clay retorts, exhausters, and other requirements of the manufacture, and should have previously filled a similar situation. Wages 31s. 6d. per week, with residence (on the Works), fuel, and gas.

Applications (properly endorsed) may be sent on or before Wednesday, the 15th of April instant, to the Office of the Company, 56, High Street, ROCHESTER.

WILLIAM SYMS, Secretary.

April 3, 1868.

WANTED, by the Advertiser, a situation as WORKING MANAGER. Can set clay or iron retorts, and do all necessary repairs on a Gas-Work. Can read meter indices, and do gas-fitting, &c. Satisfactory testimonials can be given as to character and ability.

Address R. N., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES.

A Manager of 15 years experience is desirous of a re-engagement in a similar capacity, or as Manager and Secretary.

Address X., Messrs. Marlborough and Co., Ave Maria Lane, LONDON.

TO GAS COMPANIES.

THE Advertiser, who has had considerable experience, and can give good references, desires to obtain a situation as MANAGER in small sized Gas-Works, or as Fitter in large Works.

Address H. H. E., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS & CONTRACTORS.

WANTED, several lengths of 16 or 18-in. ▭ or Circular HYDRAULIC MAIN, Oval Mouthpieces, 18 by 15, with not less than 4-in. outlets, saddles, and dips, to suit (second hand).

Forward price and particulars to C. E., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COAL TAR.

TO BE LET, immediately, for One, Two, or Three years, the TAR produced at the Works of the Sunderland Gas Company. Quantity about 200,000 gallons per annum.

The principal manufacturing station of the Company has a siding on to the North-Eastern Railway, and is a short distance from the South Dock.

The Directors will receive tenders until May 4.

JOHN H. COX, Secretary.

GASHOLDER FOR SALE.

ONE, 40 ft. diameter and 16 ft. deep; Four, 40 ft. diameter and 13 ft. deep; One, 28 ft. diameter and 8 ft. deep. All quite new.

For particulars apply to THOS. PIGGOTT & SON, Swallow Foundry, Spring Hill, BIRMINGHAM.

FOR SALE, the undernoted Gas-METERS, the whole of which have been made since 1862, and are stamped in accordance with the requirements of the "Act for Regulating Measures used in Sales of Gas," are offered for Sale at a reduction of 50 per cent.

Made by Messrs. COWAN, EDINBURGH:—

38 5-light Meters.
119 3-light do.
24 2-light do. } Esson's Patent Compensating Fountain.
23 3-light do. Kay's Patent.

Made by ALDER, EDINBURGH:—

25 No. 1 Meters.

The whole of the above Meters, being surplus stock of the "Perth New Gas Company," have only been in use for a short time, and are in good order.

For particulars apply to the SECRETARY of the "Perth Gaslight Company."

THE Directors of the Over Darwen Gaslight Company are prepared to receive TENDERS for the supply of 70 CLAY RETORTS, the same to be delivered at their Works in Charles Street, Over Darwen; particulars of which may be known on application to Mr. Green, Manager.

Tenders to be sent, addressed to Jas. Shorrock, Esq., Chairman of the Directors, not later than April 20, 1868.

The Directors do not bind themselves to accept the lowest or any tender.

RICHARD GREEN, Engineer & Manager.

Over Darwen, March 31, 1868.

THE Directors of the Southampton Gaslight and Coke Company are desirous of SELLING the following apparatus:—A set of Four PURIFIERS, 12 ft. square, with centre hydraulic valve, covers, and sieves; an Annular CONDENSER of four columns and chambers, with 12-in. connexions; about 120 ft. run of Cast-Iron HYDRAULIC MAIN, D-shape, 14 in. by 12 in., with 75 complete sets of ascension-pipes and mouthpieces.

Full particulars may be obtained of Mr. DURKIN, Manager, Gas-Works, SOUTHAMPTON.

GREAT CENTRAL GAS CON-SUMERS COMPANY.

NOTICE is hereby given that the THIRTY-FOURTH HALF-YEARLY ORDINARY MEETING of the SHAREHOLDERS of the above Company will be held at the London Tavern, Bishopsgate Street, on FRIDAY, the 24th of April instant, at Six o'clock in the Evening precisely, to receive the Directors Report, to declare a Dividend for the half year ending the 31st of December, 1867, and to elect two Directors in the place of those retiring by rotation, who, being eligible for re-election, offer themselves accordingly.

R. M. MASSEY, Secretary.

The Books of the Company will be closed for the Transfer of Shares from the 13th of April to the 25th of April.

28, Coleman Street, London, April 4, 1868.

THE Directors of the Over Darwen Gaslight Company are prepared to receive TENDERS for the supply of about 1000 yards of 6-in. CAST-IRON PIPES, and also about 1000 yards of 2-in. ditto. Particulars may be known on application to Mr. Green.

Tenders to be sent not later than April 20, addressed to James Shorrock, Esq., Chairman of the Directors, Charles Street, Over Darwen.

The Directors do not bind themselves to accept the lowest or any tender.

RICHARD GREEN, Engineer & Manager.

Over Darwen, March 31, 1868.

TAR & AMMONIACAL LIQUOR.

THE Directors of the Victoria Docks Gas Company are prepared to receive TENDERS for all the TAR and AMMONIACAL LIQUOR they may have to dispose of at their Works, North Woolwich, for a period of two years from the present time.

The Tar and Liquor to be removed as required by the Company, and will be loaded into the Contractor's barges at the Works; or, should the navigation of the river Thames be from any cause interrupted, into his waggons.

Payment in cash, monthly, within ten days after delivery of account.

The Directors do not bind themselves to accept the highest or any tender.

Tenders to be sent to the Company's Offices, 19, Spring Gardens, CHARING CROSS, S.W., on or before the 1st proximo.

April 9, 1868.

THE LEWES GASLIGHT COMPANY.

THE Directors of this Company will be prepared to receive TENDERS at the time hereafter mentioned for the necessary excavations and the construction of a Cast-Iron GASHOLDER-TANK, 92 ft. by 24 ft.

Plans and specification may be seen, and other information obtained, on and after the 20th inst., by application, at the Works, to Mr. Wright, Manager.

Sealed tenders, marked "Tender for Tank," are requested to be delivered on or before the 6th day of May next, addressed, under cover for the Directors, to the undersigned.

The Directors do not bind themselves to accept the owest or any other tender.

EDWARD HILLMAN, Clerk to the Company.

Lewes, April 9, 1868.

CATHELS'S Patent Four-way Disc GAS-VALVE, now in general use, is the best Valve for Purifiers, Scrubbers, Station-Meters, and other apparatus in Gas-Works, ONE VALVE SERVING AS THREE ORDINARY VALVES, with a simplification of the connecting-pipes. It is simple, strong, and durable; has no springs, ground faces, or rubbing surfaces; is easily worked, and indicates at a glance the passage of the gas.

CATHELS'S Patent District Dry Gas GOVERNOR is the only perfect self-acting contrivance for regulating the pressures in the higher levels of a district. It enables such pressures to be reduced to any extent desired, and yet be INCREASED AND DIMINISHED, AS WANTED, PROPORTIONATELY WITH THE INITIAL PRESSURE. It is simple, certain in its action, and of moderate cost.

For descriptive circulars, prices, and testimonials, of the Valve and Governor, apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

TO GAS ENGINEERS.

THE Directors of the Kingsbridge Gas Company are desirous of receiving TENDERS for supplying the necessary materials for and constructing during the ensuing summer a range of Four Beds of RETORTS; two of the Beds or Ovens to be capable of receiving a bench of five Retorts each, and the other two capable of receiving three Retorts each.

Two of the benches of Retorts to be fixed in place ready for work—viz., one of five, and one of three. The Retorts to be of clay. The contract to include the chimney, all the masonry and brickwork, the stays or braces and tie-plates to masonry and brickwork, the hydraulic main, stand, dip, and all other pipes, condensers, valves and purifiers, and all the necessary apparatus, free of freight and carriage, for making, purifying, and conveying the gas that may be made by at least ten Retorts in full work at the same time to the inlet of the existing gasholder, which is about 70 ft. in a direct line from the wall against which the back of the Retorts is intended to be placed.

The work must be completed, ready for making gas, on or before the 1st day of September next.

Sealed tenders, endorsed "Tender for Gas-Work," to be sent not later than Monday, the 20th day of April proximo, to the Secretary of the Gas Company, Kingsbridge, Devon, of whom any further information may be obtained.

The Directors do not pledge themselves to accept the lowest or any tender.

By order of the Directors,

W. JARVIS, Secretary.

Kingsbridge, March 11, 1868.

POPE & PEARSON'S Gas Coal.—We beg to call the attention of all Gas Companies to this important winning, at a depth of 1275 feet. The yield of gas is more than 10,000 cubic feet per ton, with an illuminating power of 20 spermaceti candles, producing 12½ cwt. of coke per ton. The Coals are now being used by the Gas Companies in London. One Engineer, after trial, gives the following results:—

10,000	cubic feet per ton, and	19·13	candles.
11,468	,, ,,	16·57	,,
12,000	,, ,,	15·42	,,
13,260	,, ,,	15·00	,,

This valuable Coal can be delivered in London within 1s. per ton of the ordinary Newcastle Gas Coal; can be shipped at the ports of Hull and Goole, or by railway to any station.

For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near Leeds, YORKSHIRE.

TO GAS ENGINEERS & FITTERS.

EVERY description of Gas Lanterns and Reflector Lamps for shop Windows kept in stock. W. DAVIS, 17, Wells Street, Oxford Street, LONDON, W.

Mr. H. GORE,

CONSULTING GAS ENGINEER,

20, ALFRED PLACE, BEDFORD SQUARE, LONDON, W.C.

Plans and Specifications prepared for the Erection of NEW or ALTERATION and IMPROVEMENT of EXISTING WORKS. Valuations made.

DESIGNS FOR WORKS & MACHINERY *specially adapted for India, China, & South America.*

Drawings and Specifications for improved RETORT SETTINGS.

B. CARPENTER'S

IMPROVED

WOOD SIEVES FOR GAS PURIFIERS.

WORKS:

14, JOHN STREET, PENTONVILLE ROAD,

LONDON, N.

The above Sieves are used by the principal Gas Companies in London and the country. Their utility, durability, and cheapness combined, render them superior to all others.

Testimonials from Gas Engineers who have tested their qualities forwarded on application.

All orders punctually attended to, and estimates given if required.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

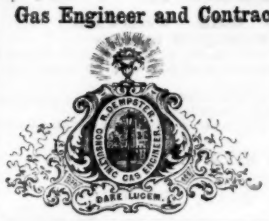
A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

ROBERT DEMPSTER,

Gas Engineer and Contractor, Rose Mount Foundry, Elland, near Halifax.



R. D. recommends his Fire-Brick Retorts to Engineers and Managers of Gas Companies; they last from 10 to 12 years.

Iron and Fire-Clay Retorts.
Annular and Pipe Condensers.
Scrubbers and Purifiers, all sizes.
Steam-Engines and Exhausters.
Hydraulic Centre-Valves.
Station-Meters and Governors.
Photometers & Pressure-Gauges.
Lamp-posts and Brackets.
Cast-Iron Mains and Syphons.
Wrought-Iron Tubes, Water Tanks.
Wrought-Iron & Cast-Iron Roofs.
Gasholders, Single-Lift or Telescopic.
Gas Castings of every description.
Retort Setters and Fitters sent to all parts of the country.
Wood Sieves for Purifiers.

Plans and Specifications prepared.

THE LIQUID METER COMPANY,
LIMITED.

A. A. CROLL, Chairman. GEORGE RAIT, Managing Director.

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WOLVERHAMPTON RETORT WORKS.
ESTABLISHED **1840.**

JOHN EUNSON AND SON,
GAS ENGINEERS, AND MANUFACTURERS OF CLAY RETORTS,
AND FIRE GOODS IN GENERAL,
WOLVERHAMPTON.

Retort Mouthpieces, Bolts, Nuts, and every description of Wrought-Iron Work.

TO MANAGERS OF GAS-WORKS.

MANN'S IMPROVED SCRUBBER.

See Description and Sketch in "JOURNAL OF GAS LIGHTING," March 31, 1868.

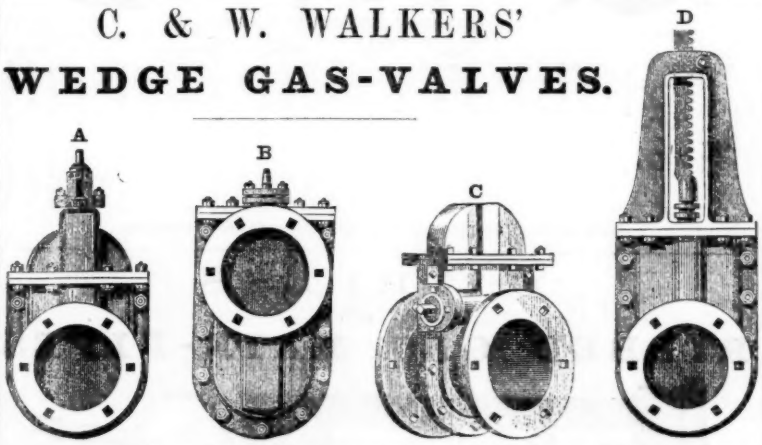
MESSRS. WESTWOOD & WRIGHTS are prepared to submit estimates for the supply and erection complete of the above, either in London or the Provinces.

MESSRS. W. & W. have already constructed several, which are now in successful operation, and give great satisfaction.

In cases where Scrubbers are already constructed, estimates will be submitted for altering and adapting to this principle.

Messrs. WESTWOOD and WRIGHTS,
No. 4, WHARF, CANAL ROAD, KINGSLAND ROAD, LONDON, N.
HOPE BOILER & GASOMETER WORKS,
BRIERLEY HILL, STAFFORDSHIRE, NEAR DUDLEY.

C. & W. WALKERS'
WEDGE GAS-VALVES.



These justly celebrated and well-known Gas-Valves of the most perfect workmanship and construction are made at as low a price as any other kind.

A—Above-ground Screw Gas-Valve, with improved indicator to show when open and shut, is the best kind of Valve for heavy pressures, such as the oxide of iron purification.

B—Under-ground Screw Gas-Valve.

C—Internal Rack Gas-Valve, with wrought-iron pinions.

D—Ordinary Rack and Pinion Valve, with strong undamageable racks and pinions.

MIDLAND IRON-WORKS,
DONNINGTON, NEWPORT, SHROPSHIRE.

PURIFICATION OF GAS.

FRODINGHAM IRONSTONE MINES,
NEAR
BRIGG, LINCOLNSHIRE.

Gas Companies can be supplied from these Mines with OXIDE of IRON, for the purification of Gas, on reasonable terms, and in any quantity that may be required.

This material is a natural Oxide, and is supplied to Gas Companies as taken from the Mines, without any admixture of deleterious matter. It acts freely, and will purify a much larger quantity of gas per ton, than the generality of the material now in use under this name.

It will be found highly beneficial in large establishments, where they are liable to be called upon occasionally to make a much greater quantity of gas than usual, as well as in small establishments where they are limited in space, as by its adoption a much larger quantity of gas can in much less time be purified with the same quantity of material.

Apply to Mr. JAMES SHERWOOD, at the Mines; or to Mr. LIVESEY, 6, Victoria Street, WESTMINSTER, London Agent.

NO NECESSITY
FOR
CANNEL COAL

If POPE and PEARSON'S GAS COAL is used.

WEST RIDING AND SILKSTONE COLLIERIES,
NEAR LEEDS.

NINETEEN YEARS PRACTICAL EXPERIENCE.

EDWIN BENTLEY,
RETORT SETTER,
29, LOWER HOPE STREET, HALIFAX,
YORKSHIRE.

Fire-Clay and Iron Retorts, Double and Single Grooved Brick Retorts, of every description.

Bentley's Improved D Brick Segment Retorts, 5 or 3 in one bed.

Testimonials and references on application.

LAMBERTS
PATENT GALVANIZED IRON COCKS,
WITH WHITE METAL PLUGS.

TRADE (L) MARK.

Warranted not to corrode or set fast, and are 50 per cent. cheaper than Brass Cocks.

THOMAS LAMBERT AND SONS
Manufacturers,
SHORT STREET, LAMBETH, LONDON.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

THE
BRITISH IRON TUBE COMPANY,
MANUFACTURERS OF
PATENT WELDED WROUGHT-IRON TUBES & FITTINGS,
For Gas, Steam, and Water;
SCREWING TACKLE, CORE BARS,
Hydraulic and other Tubes and Coils, to order.

WORKS, WAREHOUSE, & OFFICES:
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AGENTS IN LONDON:
D. W. OGG AND CO., 3, JEFFREY'S SQUARE, ST. MARY AXE.

D. W. OGG and CO. have lately engaged to represent one of the largest shippers of Scotch Cannels at prices that cannot fail to command the attention of Gas Companies at a period like the present, when quality of gas seems so desirable.

Offices, 3, Jeffrey's Square, St. Mary Axe, LONDON.

Now ready, price 21s., bound in cloth, lettered,
THE SIXTEENTH VOLUME
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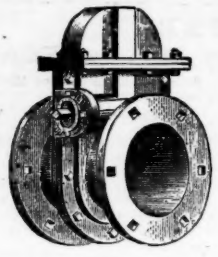

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B. DONKIN & CO.'S
IMPROVED GAS VALVES
WITH WROUGHT-IRON PINIONS
from 2 inches to 18 inches, price 9s. 6d. to 13s. per inch diameter
List of prices, with full dimensions of all sizes up to 36 inches, to be had on application.
These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.
Valves made with Outside Racks to order. Also, Screw Water-Valves with Gun-Metal Faces.
B. DONKIN & CO.,
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NEAR GRANGE ROAD, BERMONDSEY.

F. & C. OSLER,
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Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards
(Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced MESSRS. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

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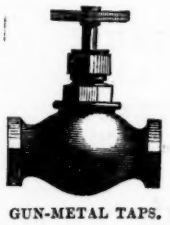
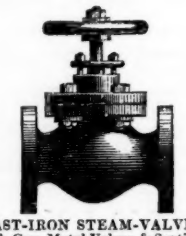
MANUFACTURER OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, &c. &c.
Sole Manufacturer of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.

MATHER AND PLATT,
SALFORD IRON-WORKS, MANCHESTER,
Beg to call attention to their Revised List of Prices of VALVES, TAPS, &c. They also request the notice of Water Companies and Hydraulic Engineers to their IMPROVED SLUICE-VALVES for Water. The Slides have Gun-Metal Facings, are of wedge form, and when screwed down are tight on both sides.



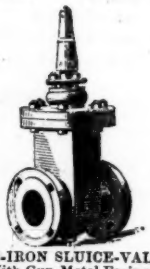
GUN-METAL TAPS.

Bore.	Price.
½ inch	£0 4 0
¾ "	0 4 6
1 "	0 6 0
1¼ "	0 8 6
1½ "	0 11 0
1¾ "	0 14 0
2 "	0 18 0
	1 2 6



CAST-IRON STEAM-VALVES.
With Gun-Metal Valves & Seatings.

Bore.	Price.
2 inches	£1 2 6
3 "	1 17 6
4 "	2 15 0
5 "	3 15 0
6 "	4 17 0
7 "	6 0 0
8 "	7 5 0
9 "	8 15 0
10 "	10 10 0
11 "	12 5 0
12 "	14 0 0

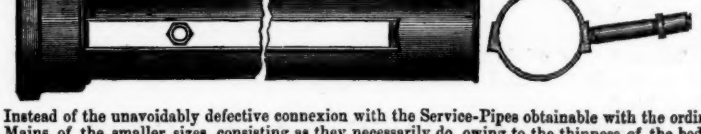


CAST-IRON SLUICE-VALVES.
With Gun-Metal Facings.

Bore.	Price.
2 inches	£1 10 0
3 "	2 5 0
4 "	3 0 0
5 "	3 16 0
6 "	4 14 0
7 "	5 14 0
8 "	6 16 0
9 "	8 0 0
10 "	9 6 0
11 "	10 14 0
12 "	12 4 0

Prices and particulars of all other forms and sizes can be had on application.

CATHELS'S
PATENT
RIBBED GAS MAIN-PIPES.



Instead of the unavoidably defective connexion with the Service-Pipes obtainable with the ordinary Gas-Mains of the smaller sizes, consisting as they necessarily do, owing to the thinness of the body of the Pipe, of but two or three imperfectly formed threads, too often shaken loose and leaky by the mere ramming of the ground over the Service when laid, or subsequently rendered so by the oscillation caused by the traffic over them, the above simple and inexpensive expedient, by giving a proper thickness of metal where it is required to tap into, ensures a PERFECT AND PERMANENT GAS-TIGHT JOINT, with little extra weight of iron.

Application to be made to
Messrs. BEGGS & SON, 37, SOUTHAMPTON STREET, STRAND, LONDON.

PARIS EXHIBITION,

1867.

HONOURABLE MENTION.

NEWTON AND BRADDOCK,

GLOBE METER-WORKS, OLDHAM,

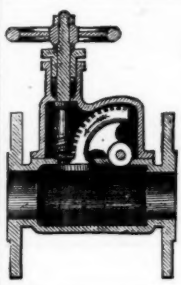
Manufacturers of

STATION METERS for GAS-WORKS, CONSUMERS METERS, GOVERNORS,

GAUGES, PRESSURE AND EXHAUSTER REGISTERS,

EXHAUSTER REGULATORS, &c.

N.B.—The flanges of the plates for the Square Station-Meters are planed so as to ensure perfect joints—guaranteed not to leak.



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QUADRANT-MOTION SLUICE or GAS VALVE.

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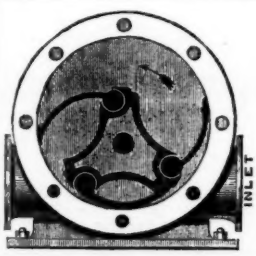

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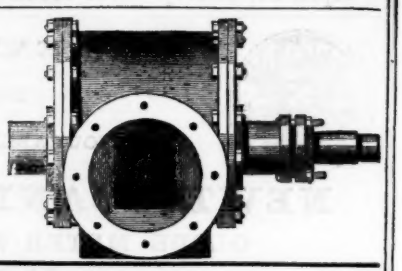

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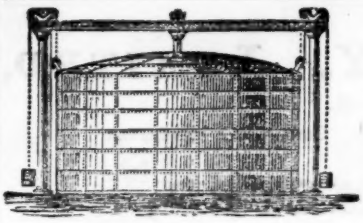

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